

A revision of the *Halysidota tessellaris* species-group (*Halysidota* sensu stricto) (Lepidoptera: Arctiidae)

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Synopsis

The 28 species considered to be monophyletic and congeneric with *Halysidota tessellaris* Smith (the type-species of *Halysidota* Hübner, a genus of the New World tribe Phaegopterini) are characterized, keyed and discussed. Seven new species and one new subspecies are described, fourteen names are removed from synonymy, nine subspecific names are elevated to species rank, one subspecific name is reinstated as a valid specific name, five names are newly placed in synonymy and one species is transferred from *Opharus* Walker to *Halysidota*. The phylogeny and defence strategies of *Halysidota* sensu stricto (the *tessellaris*-group) are discussed.

Introduction

The reasons for undertaking the present study were twofold. First, in connection with a projected volume of the *Moths of North America north of Mexico* (Dominick *et al.*, Eds), it was necessary to identify those species of *Halysidota* Hübner that are similar in appearance to *H. tessellaris*. Second, there was a need to provide valid names for species of moths used by the author in food-acceptance trials with insectivorous birds in northern Venezuela.

Two species of *Halysidota* sensu stricto (*tessellaris* and *harrisii*) are minor pests of forest and shade trees in North America. The abundance of *schausi* and *fuliginosa* in parts of Central America suggests that these too are potential pest species.

Status of *Halysidota* Hübner

About 200 species are currently placed in the genus *Halysidota* (sensu Seitz, 1922, and subsequent authors) but I consider only 28 of these to be congeneric with *tessellaris*, the type-

species. I have examined the type-specimens of most of the remaining species, including the genitalia of a representative sample (see Watson, 1971, in which the types of 96 nominal species of *Halysidota* are figured) but it is clear that much revisionary work needs to be undertaken before these can be placed with confidence in other genera or in new genera established to accommodate them. Some should probably be placed in *Lophocampa* Harris, *Thalesa* Schaus, *Leucanopsis* Rego Barros, *Sontia* Walker, *Amastus* Walker or *Hemihyalea* Hampson. The type-species of *Euhalsidota* Grote, *Munona* Schaus and *Euschausia* Dyar, which are also currently placed in *Halysidota*, should be removed. These changes are outside the scope of the present paper, however, especially as some of the problems are now being investigated in the United States by Professor J. G. Franclemont.

In the present paper I redefine the genus *Halysidota* and discuss the 29 species now considered to comprise this apparently monophyletic group. [The use in the text of the synonymous terms 'tessellaris-group' and '*Halysidota* sensu stricto' is dictated by syntactic convenience.]

Previous confusion concerning the identity of *tessellaris*-group species has resulted from the close resemblance in both external and genitalic characters between species. In Mexico, for example, adult *donahuei* are probably indistinguishable externally from adult *instabilis*, and it is probably not possible to separate specimens of the North American *tessellaris* and *harrisii* on external characters. There are apparently no male genitalic differences between the supposed sister-species *schausi* and *davisii*, between *tessellaris/harrisii* and *meridionalis* and between *underwoodi* and *pectenella*. Seitz (1922) illustrated in colour 22 nominal species of *Halysidota* sensu stricto. Thirteen of these illustrations are misleading as a guide to the species involved and are possibly based on misidentifications (that of '*cinctipes*', for example). The figures which do depict the relevant species fairly well are those of *meridionalis*, *underwoodi* (the figures of '*bricenoi*' and '*meridensis*', but not '*underwoodi*'), *atra* (both sexes), *tucumanicola* ('*tucumana*'), *intensa* ('*subterminalis*') and *masoni*. More recent confusion has resulted from a paper by Travassos (1963) in which 22 species and subspecies names were placed in the synonymy of *tessellaris*; only two of these names are in fact junior synonyms.

Material, acknowledgements and abbreviations

Specimens were lent to me by the following institutions: Academy of Natural Sciences (ANS), Philadelphia; Allyn Museum of Entomology (AM), Sarasota; American Museum of Natural History (AMNH), New York; Carnegie Museum (CM), Pittsburgh; Los Angeles County Museum of Natural History (LACM), Los Angeles; Muséum national d'Histoire naturelle (MNHN), Paris; Museum für Naturkunde der Humboldt Universität (MNHU), Berlin; National Museum of Natural History (USNM), Washington, D.C.; Texas A & M University (TAM), College Station; Universidad Central de Venezuela (UCV), Maracay; Universidade Federal do Paraná (UFP), Curitiba; University Museum (UM), Oxford; Zoologische Sammlung des Bayerischen Staates (ZSBS), Munich.

Valuable material was also provided by Mrs Avril Fox, London; Dr Claude Lemaire, Paris; Mr H. R. Pearson, Rio de Janeiro; and by Count H. de Toulgoët, Paris. Other material used during this study forms part of the British Museum (Natural History) (BMNH) collections and includes specimens I collected in Costa Rica, Venezuela and the United States.

Collectors' names have in general been omitted from the lists of examined material but have been included in primary type-data. This has been done in the interests of economy and is not an indication that I underrate the valiant effort of the collectors, some of whom operated before the advent of mechanized transport.

I am grateful to the following colleagues and friends who arranged loans of material: V. O. Becker, the late H. K. Clench, W. Dierl, J. P. Donahue, D. C. Ferguson, F. Fernandez Yepez, J. W. Ismay, C. Lemaire, O. Mielke, J. Y. Miller, L. D. Miller, D. Otte, H. R. Pearson, R. Peigler, F. H. Rindge, E. L. Todd, H. de Toulgoët and P. Viette. Special thanks are due to Julian Donahue, Francisco Fernandez Yepez and Lloyd Martin, without whose help my visits to Central and South America and to south-western U.S.A. would have been impossible. Don Davis, Wolfgang Dierl, Doug Ferguson, Jackie and Lee Miller and Ed Todd are thanked for their kindness during visits to collections under their care.

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The technical assistance of David Goodger is gratefully acknowledged and that of Tim Willett-Whittaker in the early stages of this study. Tina Adams typed the final draft of the manuscript.

The terms 'sp. rev.' and 'nom. rev.' indicate that a species or subspecies name respectively has been removed from synonymy, 'stat. n.' a species-group name that has changed its status, e.g. from subspecific to specific rank, and 'stat. rev.' a previously rejected status of a species-group name that is now accepted. Abbreviations of depositories of studied material have been given on p. 2.

Illustrations

The individual parts of the male genitalia are to the same scale for each species unless bar-scales indicate otherwise. Microscope slide preparations from which the illustrations of genitalia have been produced are indicated in the legends as, for example, 'slide 2256' if this is a BMNH preparation. If the slide is the property of another institution, the slide number, if any, is preceded by an appropriate annotation, e.g. 'USNM slide AW317'. All the photographs were taken by the Photographic Unit of the BMNH.

Phylogeny

The 29 species of the *tessellaris*-group closely resemble one another in overall features of the male genitalia and are judged to be monophyletic on the basis of two synapomorphic genitalic characters: 1, the presence of a digitate lobe on each side of the vinculum; 2, the presence of a flattened process (contorted in some species) at or near the middle of the costal margin of the valve. The sister-group or sister-species of *Halysidota* has not been identified as such but will possibly be found amongst other long-winged Phaegopterini currently placed in *Halysidota* sensu lato, *Amastus* Walker or related taxa.

Within *Halysidota* sensu stricto there are three subgroups. Subgroup A is a fairly homogeneous, apparently monophyletic assemblage of 27 species sharing two apomorphies: 1, the presence of a distinctive marking at the base of the forewing formed by the partial confluence of the sub-basal and antemedial fascia and 2, the presence of a well-marked reniform (or discocellular patch) (Fig. 2). *H. masoni* stands apart from the rest of its subgroup by virtue of two autapomorphies: 1, the bright orange ground-colour of the forewings and 2, the greyish white colour of the fasciae. The remaining 26 species are synapomorphic in respect of the blue-green or greyish green colour of the mid-dorsal line on the thorax and the margins of the patagia and tegulae, but their interrelationships are in general uncertain.

The proposed linking of *tessellaris* and *harrisii* as sister-species is based on synapomorphy of the uniform coloration of the clypeofrons and palp which lack brown scales in these two externally indistinguishable species. The larvae of *tessellaris* and *harrisii* are easily distinguished from each other and have different food plant preferences; *tessellaris* is a general feeder on broad-leaved trees (on occasion including *Platanus*), whereas *harrisii* feeds exclusively on *Platanus*, a difference which may have had some bearing on the evolution of *tessellaris* and *harrisii* from a supposed common ancestor. *H. meridionalis*, a Mexican species, is a possible sister-species of the pair *tessellaris* and *harrisii*. It too lacks brown scales on the clypeofrons, unlike most specimens of all other species of the *tessellaris*-group. Its genitalia are identical to those of *tessellaris*, but most specimens are distinguishable on colour-pattern from *tessellaris* and *harrisii*. The two alternatives to this explanation of the relationships involve accepting *meridionalis* and *harrisii* as the sister-group of *tessellaris*, or *meridionalis* and *tessellaris* as the sister-group of *harrisii*, but an assessment based on overall similarity of adult characters indicates that the first interpretation is more likely to prove correct. The relationship of the

Antillean *insularis* to the trio *tessellaris*, *harrisii* and *meridionalis* is also possibly monophyletic; the male genitalia are indistinguishable from those of *tessellaris* except for the size of the spines in the vesica, but there are no identifiable synapomorphies to support this grouping.

H. instabilis and *donahuei* are probably sister-species on the basis of the shape of the uncus which is strongly flanged laterally (Figs 80, 82), a feature judged to be apomorphic. *H. cinctipes* and its presumed vicariant *ata* are synapomorphic in respect of the large mid-costal lobe of the valve, a character state shared with *nigrilinea* and *yapacaniae*, neither of which, however, are considered to be close to *cinctipes* or *ata*. On the basis of overall dissimilarity in colour-pattern, it seems likely that the large mid-costal lobe of *nigrilinea* and *yapacaniae* evolved independently in each of these species and in the sister-species pair *cinctipes* and *ata*.

H. schausi and *davisii* differ in several characteristics of the colour-pattern but have identical male genitalia. Their association as sister-species is supported by allopatry, and by synapomorphy of the tegumen lobes which are greatly enlarged and heavily spinose.

Other species of subgroup A having character states judged to be apomorphic are as follows.

atra. Sexually dimorphic in coloration (males dark brown, females yellow-brown).

cinctipes. Thorax partly blue-green ventral to eyes and forewing.

conflua. Fasciae confluent over much of forewing.

fumosa. Longest female antennal pectination more than twice width of antennal shaft at that point. Uncus short (Fig. 94).

intensa. Forewing markings heavily outlined with black in costal area (Figs 43, 44).

orientalis. Tegumen lobes scobinate; with oblique dorsal carina.

ruscheweyhi. Fasciae much reduced in emphasis (Fig. 11).

An assessment of phylogenetic relationships between the species of subgroup A (excluding *masoni*) based on overall similarity has in general proved to be unproductive. Both external and genitalic characteristics are fairly homogeneous throughout the group and the intraspecific variation in colour-pattern of, for example, *cinctipes* and *davisii* is as great as the interspecific differences between each of them and its sister-species *ata* and *schausi* respectively.

Subgroup B is represented by one species, *elota*. It possesses two autapomorphic features: 1, the confluence of the sub-basal and antemedial fasciae towards the costal margin of the forewing and 2, the confluence of the medial and postmedial fascia towards the anal margin of the forewing.

Subgroup C, represented by *leda*, is difficult to assess phylogenetically because of the poorly marked fasciae at the base of the forewing, but the uniformity of the discernible fasciae suggest that this is the most plesiomorphic of the *tessellaris*-group.

In the absence of subgroup C it would have been reasonable to accept subgroup B as the sister-group of A. This may still prove to be so, but the failure to find definitive characters in subgroup C leaves some doubt about the relationships of these three subgroups.

Defence

Unpalatability

During a collecting visit to Rancho Grande near Maracay, northern Venezuela, in July and August 1976, I studied the prey preferences of 18 species of birds feeding from and around a collecting sheet. The sheet was illuminated throughout the night and was covered with several hundred resting moths of many families each morning. The moths attracted the insectivorous birds, which assembled soon after dawn. Records were made of acceptances and rejections of moths tossed towards the feeding birds and of predation by the birds of moths resting on the sheet. During a total of 40 hours of observation no predation of *tessellaris*-group specimens was noted other than by flycatchers, of which the commonest were *Myiodynastes chrysocephalus* (Golden-crowned Flycatcher), *Myiarchus tuberculifer* (Dusky-capped Flycatcher) and *Contopus fumigatus* (Greater Pewee) (several records), and by a single *Philydor rufus* (Buff-fronted Foliage Gleaner) (two records, one inconclusive). Although the flycatchers accepted *underwoodi*, they did so with more care than they gave to invariably acceptable geometrids (e.g. *Pero* Herrich-

Schäffer) and noctuids (e.g. *Gonodonta* Hübner) which were taken and swallowed at once by 18 species of birds studied. For example, a Greater Pewee, having captured a specimen of *underwoodi*, shook the moth for several seconds and removed the legs before swallowing it, and both the pewee and a Dusky-capped Flycatcher were seen to shake and juggle with *underwoodi* specimens before swallowing them. Blest (1964), during tests carried out in Panama, also recorded the rejection of *tessellaris*-group specimens, in this instance by caged *Cebus* monkeys which rejected *interlineata*. Dunning (1968) found that her caged bats rejected *tessellaris*. These results suggest that the *tessellaris*-group is at least in part unpalatable to some vertebrate predators.

The foodplants of few *tessellaris*-group larvae are known (Table 2) but the larvae of *schausi* have been recorded in Uruguay feeding on Solanaceae, a group of plants well known for their poisonous alkaloid content (Hawkes *et al.*, 1979) and often favoured by aposematic distasteful Lepidoptera such as ithomiine butterflies and various arctiid moths (Brower & Brower, 1964; Rothschild *et al.*, 1979, in press). A foodplant factor may also be responsible for the apparent unpalatability of *underwoodi* whose larvae have been recorded feeding on a species of Euphorbiaceae (Fox, 1978, unpublished).

Dr Miriam Rothschild (pers. comm.) has suggested that the legs of *tessellaris* may contain irritant or toxic substances, which could be disseminated via the tibial spurs but more probably by the rupture of the tarsal segments. She points out that the claws are often left behind in the net if the insect is captured.

Feeding by adults on plants containing pyrrolizidine alkaloids (PAs) has been recorded by Pliske (1975) for *interlineata* (1 ♂), *schausi* (1 ♀) and *tessellaris* (1 ♀) at sites in Panama, Venezuela (Rancho Grande) and Florida respectively. It has been suggested by Rothschild *et al.* (1973) and Pliske (1975) that the pyrrolizidine alkaloids may have a defensive function in those species of Arctiidae and Ctenuchidae. The few records of visits by *tessellaris*-group adults to PA plants suggests, however, that PAs are not vital to the moths' chemical defences, or that they supplement existing deterrents. It is significant that some of the arctiids listed by Pliske (1975: 467) as never visiting PA plants or PA baits are probably highly unpalatable, e.g. *Viviennea moma* Schaus (Watson, 1975).

Warning coloration

The unusual coloration of *masoni* may be the result of evolution towards the bright coloration of *Anaxita decorata* (Walker) (1855: 748), a species probably sympatric with *masoni* in Orizaba, Mexico. Most species of *Anaxita* Walker have strongly striped red, orange and yellow forewings which suggest an aposematic life-style and that the genus as a whole will prove to be highly distasteful to birds and other diurnal vertebrates and probably less acceptable to these predators than species of *Halysidota* sensu stricto. *H. masoni* may therefore be a Müllerian mimic of *A. decorata*; Müllerian in the sense that *masoni*, although probably unpalatable, is less so than *decorata*. Similar associations have been described recently by Brown (1977) with species of the ithomiine genera *Melinaea* Hübner and *Mechanitis* Fabricius as the Müllerian models or 'prime movers'.

Reflex immobilization

Reflex immobilization (Blest, 1957; 1964) or death feigning as a response to physical manipulation can conceivably be a defence tactic against diurnal avian predators. A moth which drops into the vegetation where it remains motionless and concealed after having been pecked by a foraging bird is likely to escape further attention from its predator and unlikely to excite the interest of birds like flycatchers that commonly attack flying insects. Tests carried out at Rancho Grande with the three species of flycatcher listed earlier involved tossing quiescent death-feigning *underwoodi* towards the birds, alternating each offering with an active noctuid which was invariably captured and eaten. I found that *underwoodi* specimens that remained immobilized elicited no response from the flycatchers, but that those moths which started to fly were in general attacked by the birds. I have noted similar reflex immobilization by *davisii* in

Arizona, and Blest (1964) recorded the same response to handling by *underwoodi*, *interlineata* and *atra* in Panama.

The acceptance of *tessellaris*-group specimens and of other arctiids (Watson, in preparation) by flycatchers is possibly an adaptation associated with their prey-capturing technique, which frequently involves a series of energetic forays directed at flying insects. A flycatcher that eats anything it catches in the air will be at a selective advantage over one that wastes energy chasing moths it subsequently rejects. Foliage gleaners and other birds that search for resting and non-aerial insects will expend relatively little energy making investigatory pecks at insects that prove to be unpalatable.

Sound production

The production of ultrasonic clicks by the tymbal organ of *tessellaris* was reported by Roeder (*in* Blest, Collett & Pye, 1963: 205) and shown by Dunning (1968) to act as a warning of unpalatability to predatory bats. The tymbal organ of both sexes of all the *tessellaris*-group species is similar in structure, and it is therefore possible that it functions in the same way throughout the group. (The tymbal organ of *interlineata* was illustrated by Blest, Collett & Pye (1963) but without comment about its sound-producing capabilities.)

Evasive behaviour, first described by Roeder & Treat (1961) for noctuid moths, has also been recorded for *tessellaris* (Dunning & Roeder, 1965) in response to the echo-locating cries of bats. The experiments on *tessellaris* were carried out with tethered moths and there is no evidence to show whether evasion is a normal first-line defence tactic or possibly a response made after a threshold intensity of bat cries has been reached.

Systematic treatment

Characters used in the descriptions and key

Head

Colour of the clypeofrons, labial palps and the antennal scape. Shape of the apical segments of the antenna. Length of the longest antennal pectination in relation to the diameter of the antennal shaft at the base of this pectination (viewed laterally).

Thorax

Colour and markings of the dorsal surface; particularly the colour of the posterior fringe of the patagia and of the medial fringe of the tegulae, the colour of the longitudinal mid-dorsal line (if present) and the presence or absence of blue-green areas laterally. Colour and colour-pattern of the wings, particularly the forewings; especially the shape of the transverse fasciae, the intensity of black scaling bordering the costal elements of the fasciae, the reniform (discocellular marking) and along the wing veins, and the ground-colour of the wings. (The wing venation has not been found useful taxonomically.)

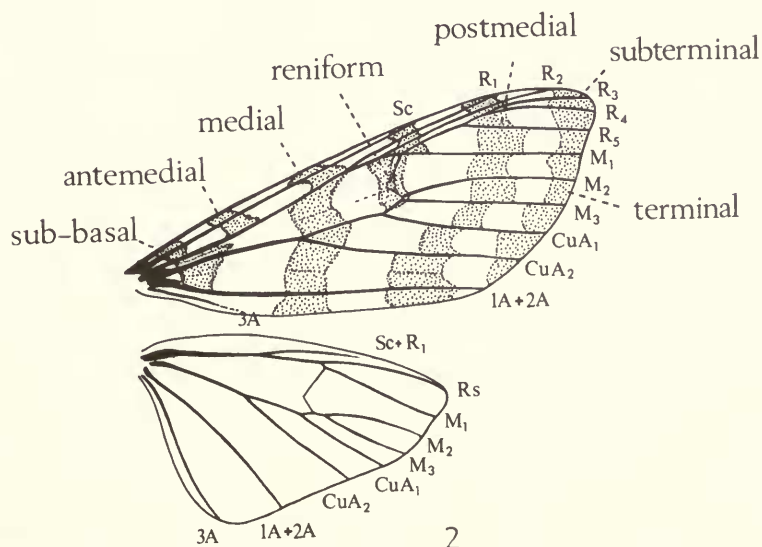
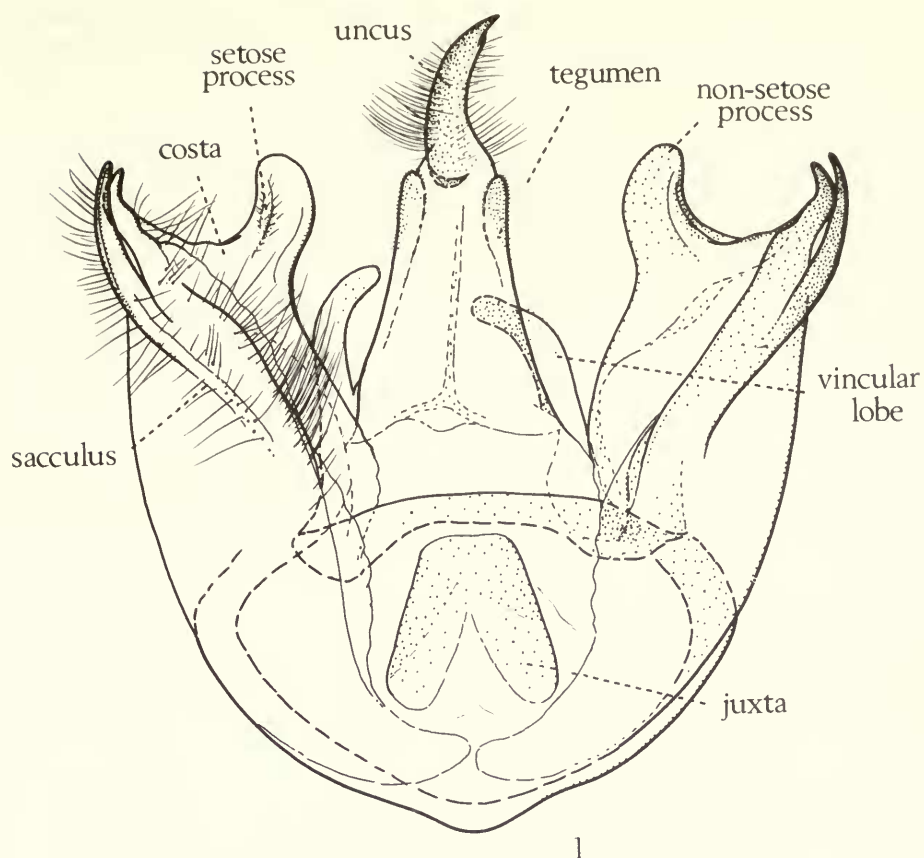
The tymbal organ is the apparently unique sound-producing organ found in many Arctiidae and some Ctenuchidae (see figures in Watson, 1975). Microtymbals are the minute ridges and furrows responsible for the production of sound (Blest, Collett & Pye, 1963).

Abdomen

Colour of the dorsal surface; presence and number of black lateral spots (one spot on each side of a segment, forming a longitudinal line of spots). Male genitalia (Fig. 1): relative lengths of the apical processes of the costa and sacculus of valve; shape and size of the mid-costal processes; length of the lateral lobes of the vinculum, degree of development of the lateral lobes or shoulders of the tegumen; shape of the uncus; shape of the vesical lobes of the aedeagus, size of vesical spines and the extent of areas covered by spines.

It is important that the vesica of the aedeagus is everted during the preparation of the male genitalia so that the pattern of spines or scobinations on the lobes of the vesica can be examined.

It has not been possible to match males and females of all the species of *Halysidota* *sensu stricto*, but descriptive data concerning females are given wherever females have been identified



Figs 1, 2 (1) *Halysidota cinctipes*, ♂ genitalia, lectotype. (2) *H. tessellaris*, upper surface of wings, showing reniform marking, transverse fasciae and venation.

with reasonable certainty. The considerable individual variation in the shape of the pre-ostial plate and the ductus bursae of the few species examined indicates that the female genitalia may prove to be of limited value in species diagnosis.

Larval characters

In *tessellaris* and *harrisii* the coloration of the larvae is more useful diagnostically than the adult colour-pattern. It is likely that efforts to breed out other species of the *tessellaris*-group would prove to be rewarding.

Genus *HALYSIDOTA* Hübner

Halysidota Hübner, [1819]: 170. Type-species: *Phalaena tessellaris* Smith, in Smith & Abbot, 1797, by subsequent designation by Kirby, 1892: 209. *Halysidota* was the spelling adopted by Berg, 1882: 214, as first reviser, from a multiple original spelling which included both *Halysidota* and *Halisidota*.

Halesidota; Walker, 1855: 732. [Incorrect subsequent spelling.] Synonyms: I do not consider that any of the junior synonyms listed in the catalogue of Strand (1919: 67) should be accepted as such.

DESCRIPTION. ♂ and ♀. Clypeofrons yellow, or yellow with brown, black or grey markings; vertex yellow, grey or brown. Labial palps yellow; or yellow marked with black, brown or grey. Antennae yellow or brown; bipectinate; longest antennal pectination (♂) 1.5 to 4.0, (♀) 0.75 to 2.25 times width of shaft at that point. Thorax yellow, orange or brown dorsally, usually with blue-green margins to patagia and tegulae and blue-green mid-dorsal stripe. Each tegula with black spot or longitudinal stripe in most specimens of all species except *masoni* and *leda*. Ventral and lateral surfaces of thorax yellow or orange; with blue-green lateral patches in *cinctipes*. Tymbal organ with between ten and 20 microtymbals. Legs yellow or grey, with dark brown or black markings; mesothoracic tibia with one pair of spurs, metathoracic tibia with two pairs of spurs. Ground-colour of wings yellow, brown (*atra* and dark forms of *fuliginosa*, *pectenella* and *underwoodi*) or orange (*masoni*). Fasciae of forewing (Fig. 2) brown, black, or brownish yellow; darker than ground-colour of wings except in *atra* and dark forms of the three dimorphic species. Reniform marking (absent in *leda*) and costal part of postmedial and more proximal fasciae outlined with brown or black in many species, and more yellowish than rest of fascia except in *leda*, *elota*, *tessellaris*, *harrisii* and *meridionalis*. Wing veins marked with brown or black in some species. Basal and antemedial fasciae united to form single distinctive marking except in *leda* and *elota*. (A spot at anal margin of wing in some specimens of *fumosa*, and rarely in a few other species, may represent the posterior part of the antemedial fascia.) Medial fascia complete or incomplete; postmedial fascia represented by a costal and a discocellular marking or more fully developed (*leda* and *elota*); subterminal fascia complete or incomplete; terminal fascia usually complete, broadest apically. Hind wing much paler than forewing, usually becoming more yellowish anally; apex with or without small brown or black marking and rarely with further traces of terminal fascia along anterior two-thirds of outer margin. Abdomen yellow or brown dorsally, paler ventrally; with or without black dots or bars ventrolaterally on each side; sternite 8 with short membranous apodemes.

♂ genitalia (see Fig. 1). Saccus small; juxta approximately V-shaped. Valve with apical costal and saccular process and with non-setose, flattened, variously contorted process (very large in *cinctipes*, *ata*, *nigrilinea* and *yapacaniae*) at or distal to middle of costal margin, and with usually smaller setose process distal to non-setose process or at its base. Vinculum with digitate non-setose lobe on each side at junction with tegumen. Tegumen narrow, bearing spinose or scobinate (*orientalis*) shoulders or lobes posterolaterally. Uncus constricted (in ventral view) except in *fumosa*, acuminate apically; with strong pre-apical lateral flanges in *donahuei* and *instabilis*. Aedeagus moderately arcuate (in lateral view); vesica variously lobate, spinose and scobinate.

♀ genitalia as in Fig. 55. Large pre-ostial plate variously shaped but typically reniform.

VARIATION. There is considerable individual variation in the pattern of wing-markings of *schausi*, *davisii*, *underwoodi*, *cinctipes* and *fumosa* (see figures). The colour of these markings and the ground-colour of the wings is, however, less variable and it is usually possible to identify tentatively most specimens of *Halysidota* sensu stricto prior to an examination of the male genitalia. There is some variation in the shape and size of the various parts of the male genitalia, particularly the uncus, lateral lobes of the tegumen and the vincular lobes. The shape and size of the ostial plate and ductus bursae in the female genitalia are also variable individually, to such an extent that they are probably not of use in separating species.

Three species are dimorphic in wing colour, having a yellow form and a dark brown or melanic form. *H. fuliginosa* and *pectenella* are known from numerous yellow specimens of both sexes and from a single brown male in each species. *H. underwoodi* is a normally yellow species but is also known from several males and females of the brown form.

H. atra is the only species distinctively sexually dimorphic in coloration (males are dark brown, females much less dark) and is the only species not represented by a yellow form in any of the collections studied.

Table 1 Foodplants of *tessellaris*-group larvae

Plant species	Plant family	Moth species	Country	Source of record
<i>Acalypha</i> <i>?macrostachya</i>	Euphorbiaceae	<i>underwoodi</i>	Venezuela	Fox (1978)
<i>Celtis spinosa</i>	Ulmaceae	<i>?brasiliensis</i> ² <i>schausi</i> ¹	Argentina Brazil	Hayward (1969) Silva <i>et al.</i> (1968)
		<i>steinbachi</i>	Argentina	Hayward (1969)
		<i>?tucumanicola</i> ²	Argentina	Hayward (1969)
<i>Celtis</i> spp.	Ulmaceae	<i>?brasiliensis</i> ² <i>schausi</i> ¹	Argentina Brazil	Hayward (1969) Silva <i>et al.</i> (1968)
		<i>steinbachi</i>	Argentina	Hayward (1969)
		<i>?tucumanicola</i> ²	Argentina	Hayward (1969)
<i>Cestrum</i> <i>nocturnum</i>	Solanaceae	<i>schausi</i> ¹	Brazil	Silva <i>et al.</i> (1968)
<i>Coccoloba</i> <i>floridana</i>	Polygonaceae	<i>cinctipes</i>	U.S.A.	Dyar (1896)
<i>Coccoloba uvifera</i>	Polygonaceae	<i>cinctipes</i>	U.S.A.	Dyar (1896)
<i>Hibiscus</i> sp.	Malvaceae	<i>cinctipes</i>	Cuba	Gundlach (1881)
<i>Morus</i> sp.	Moraceae	<i>interlineata</i>	Brazil	Lima (1936)
<i>Phrygilanthus</i> <i>acutifolius</i>	Loranthaceae	<i>brasiliensis</i>	Brazil	Silva <i>et al.</i> (1968)
<i>Platanus</i> <i>occidentalis</i>	Platanaceae	<i>harrisii</i>	North America	Dyar (1891), Forbes (1960)
		<i>tessellaris</i>	North America	Kimball (1965)
<i>Ruellia longifolia</i>	Acanthaceae	<i>steinbachi</i>	Argentina	Hayward (1969)
<i>Trema micrantha</i>	Ulmaceae	<i>brasiliensis</i>	Brazil	d'Almeida (1929)
		<i>?tessellaris</i>	U.S.A.	Slosson (1901)
<i>Trema</i> sp.	Ulmaceae	<i>?brasiliensis</i> ²	Argentina	Hayward (1969)
		<i>?tucumanicola</i> ²	Argentina	Hayward (1969)
Various broad-leaved trees		<i>tessellaris</i>	North America	Forbes (1960)

¹cited as *pallida*, a junior synonym

²cited as *schausi*, a probable misidentification.

EARLY STAGES. Little is known. Dyar (1891) described the egg of *harrisii*, and the larva, pupa and cocoon of both *harrisii* and *tessellaris*; Gundlach (1886) described the larva of *cinctipes*; and d'Almeida (1929) described the egg, larva, pupa and cocoon of *brasiliensis*. Mrs Avril Fox recently reared *underwoodi* in Venezuela (unpublished); some of her findings are recorded in Table 1 and on p. 40. The foodplants listed in Table 1 include several introduced or ornamental species and are probably atypical sources of food for the *Halysidota* species concerned (but see also 'Warning coloration', p. 5).

The larva of *tessellaris* (the Pale Tussock or Banded Tussock) is a minor pest of various broad-leaved forest and roadside trees in eastern United States and southern Canada. *H. harrisii* (the Sycamore Tussock) is common in north-eastern states of the U.S.A. on American Sycamore (*Platanus occidentalis*).

DISTRIBUTION. As shown in Table 2, the *tessellaris*-group is endemic to the New World and is chiefly tropical and subtropical in range. Only two species, *tessellaris* and *harrisii*, occur in the northern states of the U.S.A. and in Canada.

The two species with colour-patterns atypical of their group, *elota* (Jamaica) and *leda* (Guadeloupe and Dominica), may have become detached from ancestral *tessellaris*-group species during the period when the proto-Antilles were becoming established (Rosen, 1975). Subsequent radiation in Central and South America has produced the 27 species with a *tessellaris*-like colour-pattern (Fig. 2). Three of these are known from the Antilles: *cinctipes* and its vicariant *ata*, and the St Lucian *insularis*. The latter is closely similar to and possibly monophyletic with *tessellaris*, *harrisii* (North America) and *meridionalis* (Mexico) and probably owes its origin in St Lucia to dispersal and subsequent vicariance, not fragmentation of an ancestral fauna. The origin of *cinctipes* and *ata* is less clear. *H. cinctipes* is represented in Florida as well as neighbouring Cuba and the Bahamas, and could have had an ancestral Central American – Mexican – southern United States distribution or could have evolved in the Greater Antilles after arrival from Central America and subsequently crossed the short expanse of sea to Florida. (The latter explanation accords with the ideas of Scott (1972) concerning the origin of the Antillean butterflies.)

Table 2 is based on material examined during the preparation of this paper. The arrangement of countries follows a north to south sequence from North America, through Central America to Colombia, then west to east to French Guiana, followed by a north to south sequence from Ecuador to Argentina (including Brazil which is placed arbitrarily after Bolivia).

Table 2 Distribution of *Halysidota* sensu stricto

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Canada	x																												
U.S.A.	x		x			x	x						x			x					x								
Mexico	x	x				x	x						x	x		x	x	x	x	x								x	
Antilles				x																	x	x						x	x
Guatemala							x						x	x		x	x	x						x	x				
Belize																									x				
El Salvador												x					x												
Honduras							x					x						x						x					
Nicaragua							x									x		x											
Costa Rica							x						x	x		x	x	x						x		x			
Panama													x		x	x	x							x					
Colombia							x						x		x	x	x						x	x	x				
Venezuela							x						x		x	x							x	x					
Trinidad												x																	
Guyana													x																
Surinam																										x			
French Guiana														x			x							x					
Ecuador							x						x		x	x	x						x			x			
Peru							x							x	x	x	x	x					x						
Bolivia									x				x			x	x	x						x					
Brazil								x			x	x		x											x				
Paraguay								x			x																		
Uruguay					x																				x				
Argentina					x					x		x																	
Chile														x															

Key to column figures:

1, *tessellaris*; 2, *meridionalis*; 3, *harrisii*; 4, *insularis*; 5, *ruscheweyhi*; 6, *davisii*; 7, *schausi*; 8, *brasiliensis*; 9, *yapacaniae*; 10, *tucumanicola*; 11, *pearsoni*; 12, *steinbachi*; 13, *fuliginosa*; 14, *orientalis*; 15, *conflua*; 16, *underwoodi*; 17, *pectenella*; 18, *atra*; 19, *instabilis*; 20, *donahuei*; 21, *cinctipes*; 22, *ata*; 23, *nigrilinea*; 24, *intensa*; 25, *interlineata*; 26, *fumosa*; 27, *masoni*; 28, *elota*; 29, *leda*.

Key to species (males)

Colour-pattern characters refer to the upper surface of the forewing unless otherwise stated.

- 1 Sub-basal and antemedial fasciae united to form distinctive marking at base of forewing (Fig. 2); reniform (discocellular) marking conspicuous; postmedial fascia present only at costa *masoni* (p. 57) 2
- Base of forewing without marking depicted in Fig. 2; reniform marking absent or indistinct; postmedial fascia confluent anally with medial fascia, or not confluent with medial fascia and unbroken from costa to anal margin, or absent except on extreme costal margin of forewing 29
- 2 Ground-colour bright orange; terminal fascia absent (Fig. 48). Patagia and tegulae unicolorous *masoni* (p. 57)
- Ground-colour yellow or brown; terminal fascia present. Patagia and tegulae usually fringed with blue-green, greenish blue or greenish grey 3
- 3 Clypeofrons pale yellow, without markings 4
- Clypeofrons partly black, dark brown or grey 6
- 4 Apical costal process of valve extending distal to apical saccular process (Fig. 51) 5
- Apical saccular process extending distal to apical costal process (Fig. 49) *harrisii* (p. 20)
- 5 Medial fascia tapered towards anal margin (Fig. 5). Forewing at least 28 mm in length *meridionalis* (p. 21)
- Medial fascia not tapered anally (Fig. 3). Forewing 27 mm in length or shorter *tessellaris* (p. 12)
- 6 Terminal fascia incomplete 7
- Terminal fascia complete 8
- 7 Ground-colour pale yellow *davisii* (p. 24)
- Ground-colour dark brown *atra* (p. 42)
- 8 Medial, subterminal and terminal fasciae partly confluent (Figs 22, 23) *conflua* (p. 38)
- Above fasciae not confluent 9
- 9 Subterminal fascia represented by costal and anal marking, by one of these markings, or absent *interlineata* (p. 54)
- Subterminal fascia with at least one other subterminal marking in addition to costal and anal markings 10
- 10 Medial, subterminal and terminal fasciae hardly distinguishable from rest of wing except at costa (Fig. 11) *ruscheweyhi* (p. 22)
- Transverse fasciae distinctly marked 11
- 11 Markings heavily outlined with black in costal area (e.g. Fig. 28) 12
- Markings not as above 16
- 12 Outer margin of forewing nearly straight; very heavily marked (Figs 43, 44). Genitalia as in Figs 90, 91 *intensa* (p. 52)
- Outer margin of forewing more strongly arcuate and less heavily marked than in Figs 43, 44. Genitalia other than in Figs 90, 91 13
- 13 Genitalia as in Figs 74, 75; uncus weakly dilated pre-apically 14
- Genitalia other than in Figs 74, 75; uncus strongly dilated pre-apically 15
- 14 Subterminal fascia narrow, incomplete (Fig. 34); postmedial and more proximal fascia heavily outlined with black in costal area; apex of antenna as in Fig. 76 *pectenella* (p. 41)
- Subterminal fascia generally broader and complete; fasciae usually not heavily marked costally (Figs 27–33); apex of antenna as in Fig. 77 *underwoodi* (p. 38)
- 15 Lateral margins of uncus greatly expanded (Fig. 80) *instabilis* (p. 45)
- Lateral margins of uncus as in Fig. 82 *donahuei* (p. 47)
- 16 Fasciae bordered by black, then by greyish white scales (Fig. 18) *steinbachi* (p. 33)
- Fasciae without white scales 17
- 17 Uncus (usually visible in pinned specimens) as in Fig. 94 *fumosa* (p. 56)
- Uncus more slender than in Fig. 94 18
- 18 Non-setose costal lobe of valve very large (as in Fig. 56) or longer 19
- Non-setose costal lobe of valve less well-developed than in Fig. 56 22
- 19 Veins intersecting fasciae dark brown or black (Fig. 45); margins of subterminal fascia not lunulate *nigrianea* (p. 50)
- Veins intersecting fasciae less well marked than in Fig. 45; margins of subterminal fascia lunulate 20
- 20 Costal markings of fasciae distinctly yellow; veins intersecting fasciae moderately well marked (Fig. 15). Apical costal process of valve extends distal to apical saccular process; vesica as in Fig. 61 *yapacaniae* (p. 29)

- Costal markings of fasciae not distinctly yellow; veins intersecting fasciae unmarked or weakly marked (Fig. 40). Apical saccular process extends distal to apical costal process (Fig. 84); vesica as in Figs 86 or 87 21
- 21 Blue-green patch on thorax ventral to base of forewing and another ventral to eye. Vesical spines as in Fig. 86 *cinctipes* (p. 47)
- Thorax without blue-green patches laterally. Vesical spines as in Fig. 87 *ata* (p. 50)
- 22 Vincular lobes about as wide as long 23
- Vincular lobes 1.5 to 3.0 times as long as least width 24
- 23 Vesica of aedeagus distinctly spinose (Fig. 75); apical costal process of valve extending distal to apical saccular process (Fig. 74) 14
- Vesica of aedeagus scobinate, not distinctly spinose; apical costal process of valve not extending distal to apical saccular process 24
- 24 Postmedial and more proximal fasciae more heavily outlined with black in costal area than elsewhere (Fig. 17) Apical processes of valve extending distally about same distance (Fig. 64) *pearsoni* (p. 32)
- Fasciae fairly evenly outlined with black (Fig. 16). Apical saccular process of valve extending distal to apical costal process (Fig. 62) *tucumanicola* (p. 30)
- 25 Postmedial and more proximal fasciae of forewing more heavily outlined with black in costal area than elsewhere (Fig. 21). Lobes of tegumen crenulate; angulate in ventral view (Fig. 70) *orientalis* (p. 36)
- Fasciae usually not or only slightly more heavily outlined with black in costal area of forewing. Lobes of tegumen spinose; not angulate in ventral view 26
- 26 Ground-colour of wings brownish orange; subterminal fascia usually confluent with terminal fascia at middle of outer margin of forewing (Fig. 20). Setose and non-setose mid-costal processes of valve about equal in size; vesica as in Fig. 69 *fuliginosa* (p. 33)
- Ground-colour of wings yellow or buff; subterminal fascia rarely confluent with terminal fascia. Non-setose costal process distinctly larger than setose costal process of valve; vesica not as in Fig. 69 27
- 27 Fasciae yellow in costal area; lobes of tegumen large, strongly spinose (as in Fig. 56); vesica strongly spinose, as in Fig. 57 *schausi* (p. 26)
- Fasciae brownish yellow in costal area; lobes of tegumen smaller, not as in Fig. 56; vesica less strongly spinose than in Fig. 57 28
- 28 Antemedial fascia broad (Fig. 14); non-setose mid-costal process of valve well developed (Fig. 58) *brasiliensis* (p. 29)
- Antemedial fascia narrow (Fig. 6); non-setose mid-costal process of valve smaller (Fig. 51) *insularis* (p. 22)
- 29 Sub-basal and antemedial fasciae confluent costally, medial and postmedial fasciae confluent anally (Fig. 101). Tegulae without black spot; dorsal surface of thorax with longitudinal mid-dorsal line *elota* (p. 58)
- Fasciae, if present, continuous from costa to anal margin (Fig. 102). Tegulae with black spot anterolaterally; dorsal surface of thorax without markings *leda* (p. 59)

Halysidota tessellaris (Smith)

(Figs 2–4, 51)

Phalaena tessellaris Smith, 1797: 149, pl. 75. Syntypes, U.S.A. [not examined].

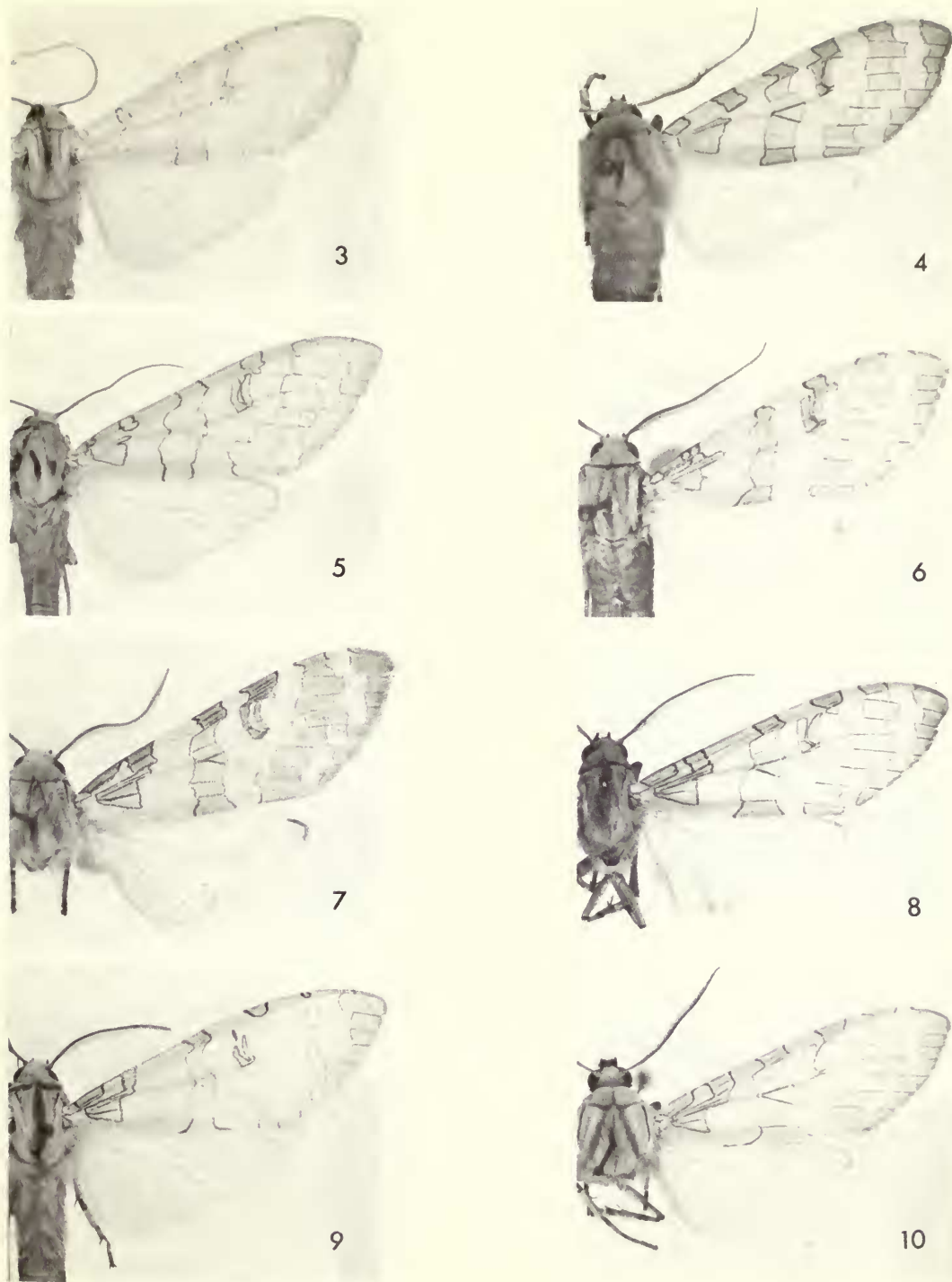
Halesidota (Lophocampa) antiphola Walsh, 1864a: 288. ♂, ♀ syntypes, U.S.A.: Illinois, Rock I. (probably lost). [Synonymized by Walsh, 1864b: 429.]

Halisdota oslari Rothschild, 1909: 283. LECTOTYPE ♂, U.S.A. (BMNH), here designated [examined]. [Synonymized by Travassos, 1963: 476.]

Halisdota tessellaris ab. *antipholella* Strand, 1919: 84. Holotype ♀, U.S.A. (BMNH) [examined]. [Infrasubspecific name.]

Halisdota tessellaris ab. *tessellaroides* Strand, 1919: 85. Holotype ♂, U.S.A. (BMNH) [examined]. [Infrasubspecific name.]

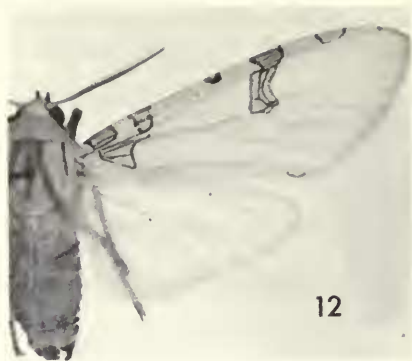
DESCRIPTION. ♂. Forewing: ♂, 23–27 mm. Head yellow, without markings on clypeofrons. Basal segment of palp yellow, rarely with black scales proximally; second segment pale yellow, with brown or black proximally in most specimens and distally in few specimens; apical segment brown or black, usually with pale yellow distally. Antenna pale yellow dorsally; longest antennal pectination between four and five times



Figs 3-10 *Halysidota*, wings, upper surface. (3) *tessellaris* ♀, Ontario. (4) *tessellaris* ♂, Florida. (5) *meridionalis* ♀, Mexico. (6) *insularis*, paratype ♂, St Lucia. (7) *schausi* ♂, Texas, Brownsville. (8) *schausi* ♂, Venezuela. (9) *schausi* ♂, Mexico. (10) *schausi*, lectotype ♂.



11



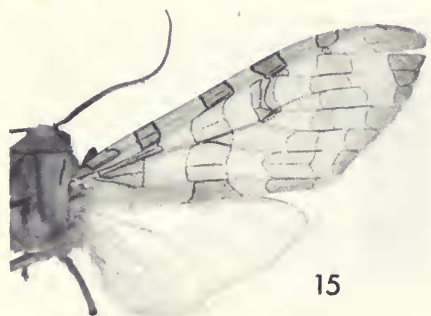
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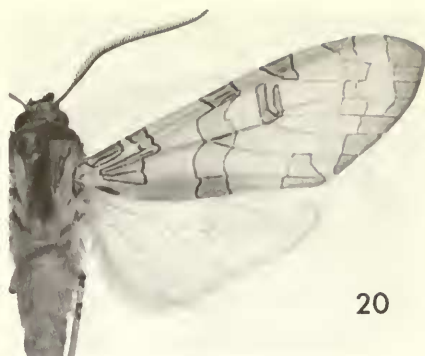


18

Figs 11–18 *Halysidota*, wings, upper surface. (11) *ruscheweyhi* ♂, Argentina. (12) *davisii* ♂, Arizona, Nogales. (13) *davisii* ♂, Arizona, Prescott. (14) *brasiliensis* ♂, São Paulo. (15) *yapacaniae* ♂, Bolivia. (16) *tucumanicola*, lectotype ♂. (17) *pearsoni* paratype ♂, Sta Catarina. (18) *steinbachi* ♂, Argentina.



19



20



21



22



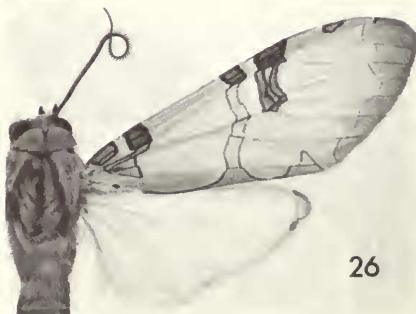
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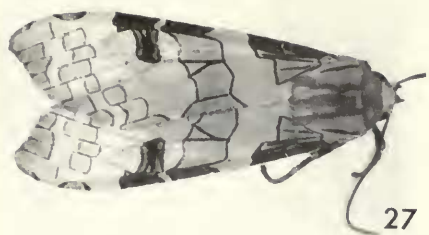


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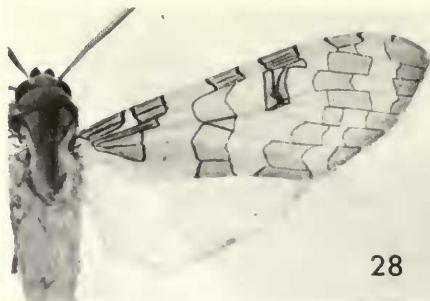


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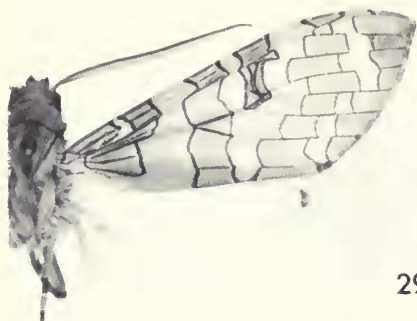
Figs 19–26 *Halysidota*, wings, upper surface. (19) *fuliginosa*, lectotype ♂. (20) *fuliginosa* ♂, Guatemala. (21) *orientalis* ♂. (22) *conflua*, holotype ♂, left-hand wings, negative reversed. (23) *conflua*, paratype ♂. (24) *instabilis* ♂. (25) *donahuei*, paratype ♂. (26) *instabilis*, lectotype ♂.



27



28



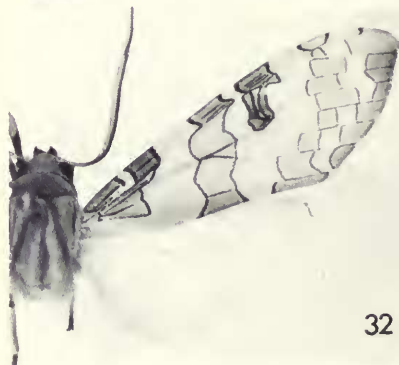
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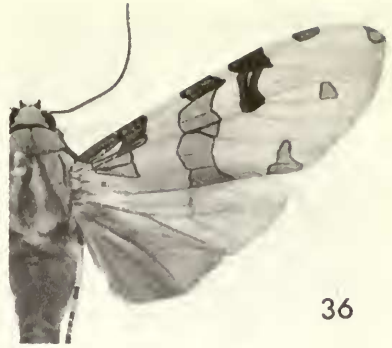


34

Figs 27-34 *Halysidota*, wings, upper surface. (27-33) *underwoodi*. (27) ♂, Venezuela. (28) ♂, Venezuela. (29) lectotype ♂ of *meridensis*. (30) ♂, Guatemala. (31) ♂, Costa Rica. (32) ♂, Costa Rica. (33) lectotype ♂ of *bricenoi*. (34) *pectenella* ♂, Guatemala.



35



36



37



38



39



40

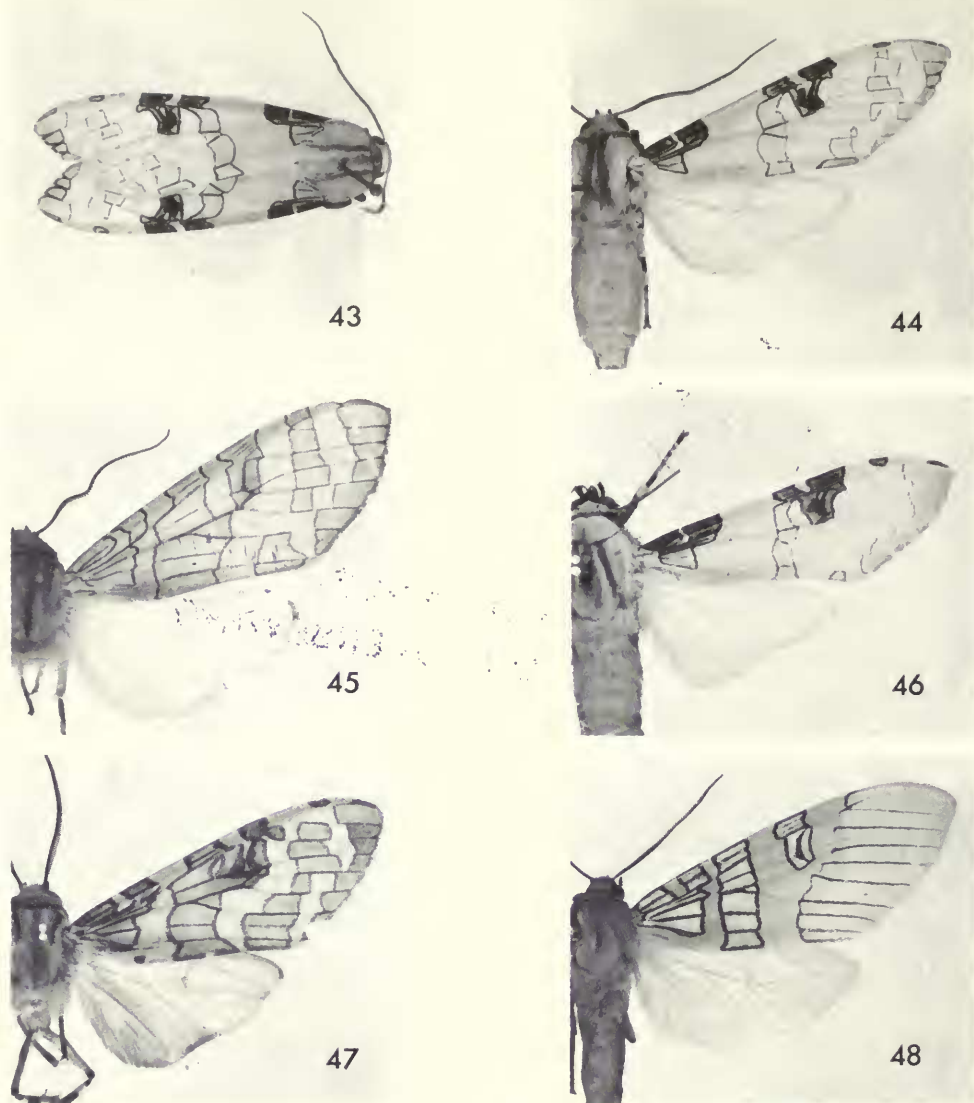


41



42

Figs 35–42 *Halysidota*, wings, upper surface. (35) *atra* ♂, Mexico. (36) *atra* ♀, Guatemala. (37) *cinctipes* ♂, Cuba. (38) *cinctipes* ♂, Florida. (39) *cinctipes* ♀, Florida. (40) *ata*, holotype ♂. (41) *ata* ♂, Puerto Rico. (42) *ata* ♂, Puerto Rico.



Figs 43–48 *Halysidota*, wings, upper surface. (43) *intensa* ♂, Peru. (44) *intensa* ♀, Guatemala. (45) *nigrilinea* ♀, Guatemala. (46) *interlineata* ♂, Brazil. (47) *fumosa* ♂, Costa Rica. (48) *masoni* ♀.

diameter of shaft at that point. Patagia pale yellow with greenish blue posterior margin. Tegulae pale yellow, bordered medially and posteriorly with greenish blue; each with black spot at anterolateral corner in some heavily marked specimens. Rest of thorax orange-yellow, with greenish blue or bluish grey mid-dorsal line. Outer surface of legs orange-yellow, inner surface pale yellow; usually with black or black-bordered pale grey markings. Microtymbal number: 16 to 18. Forewing pale buff or yellowish white above; markings more brownish, bordered with black or dark brown; under surface paler, and markings less distinct, especially at costa. Both surfaces of hind wing yellowish white, becoming pale yellow in anal region; brown apical marking present in a few specimens. Abdomen orange-yellow dorsally, pale yellow ventrally; without markings.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus; non-setose mid-costal process of valve forming dorsally directed lip. Vincular lobe about three times as long as least width. Lobes of tegumen moderately well developed; spines just visible at $\times 32$ magnification. Uncus slender at middle. Large tapered anterior lobe of vesica with two smaller ventrolateral lobes on left-hand side and with large posterior lobe and single posterolateral lobe on right-hand side.

DIAGNOSIS. Probably not distinguishable on male genitalic characters from *meridionalis*, but differs in size and colour-pattern. *H. tessellaris* is smaller (♂ forewing 23–27 mm) than *meridionalis* (28–30 mm) and few specimens exhibit the anally tapered medial fascia of the forewing of most specimens of *meridionalis*. A possible additional diagnostic character is the colour of the margins of the patagia and tegulae which are distinctly green in most specimens of *tessellaris* but are only faintly greenish grey in the few available specimens of *meridionalis*.

The adult male moth is probably indistinguishable from *harrisii* in colour-pattern and colour, but the shape of the valve apex is diagnostic (Figs 49, 51) (most collections are likely to contain both species unless examined for this character). The hair-pencils of the final instar larva are black and white, in contrast to the orange and white hair-pencils of *harrisii* (Dyar, 1891). Bred series (not available to me) are needed before female diagnostic features can be investigated.

VARIATION. The 'aberration' *antipholella* Strand is a pale-coloured but otherwise normal female specimen of either *tessellaris* or *harrisii*. The specimen named *tessellaroides*, described by Strand as an individual variant of *tessellaris*, is an unusually large male with abbreviated fasciae. Specimens with darker fasciae (Fig. 4) are normal in Florida (Kimball, 1965) and Louisiana and occur less frequently in more northerly states.

SYNONYMY OF *H. oslari*. None of the characters listed by Rothschild (1909: 16) as diagnostic for *oslari* is tenable. The forewings are not 'much rounder', the margins of the patagia and tegulae do not exhibit an 'absence of green' in the male, and the 'sooty grey' tarsi are buff or yellow in colour but encrusted with soot or detritus. The margins of the wings of the lectotype and most paralectotypes are similarly contaminated and consequently are dark grey in colour. Travassos's (1963: 476) placement of *oslari* in the synonymy of *tessellaris* is confirmed.

TYPE-MATERIAL AND FOODPLANTS. Smith (1797) records specimens from *Fagus*, *Carpinus* and *Platanus*, and his syntypic series may, therefore, have included specimens of *harrisii* which feed as larvae almost exclusively on *Platanus occidentalis*. *H. tessellaris* has been recorded from *Platanus occidentalis* (Kimball, 1965: 76) but is rarely found on the foliage of this tree, though often common on numerous other broad-leaved trees in the U.S.A. and Canada (Tietz, 1972: 630–637), where it can become a minor pest, and has been reported also on *Zea mays*. Smith's (1797) figures, however, leave no doubt that the name *tessellaris* should be associated with the species currently recognized as *tessellaris*. The two moths illustrated by Smith are fairly typical of the darker south-eastern form of *tessellaris* as currently accepted, and the larva, with black hair-pencils, is a corresponding early stage of this species.

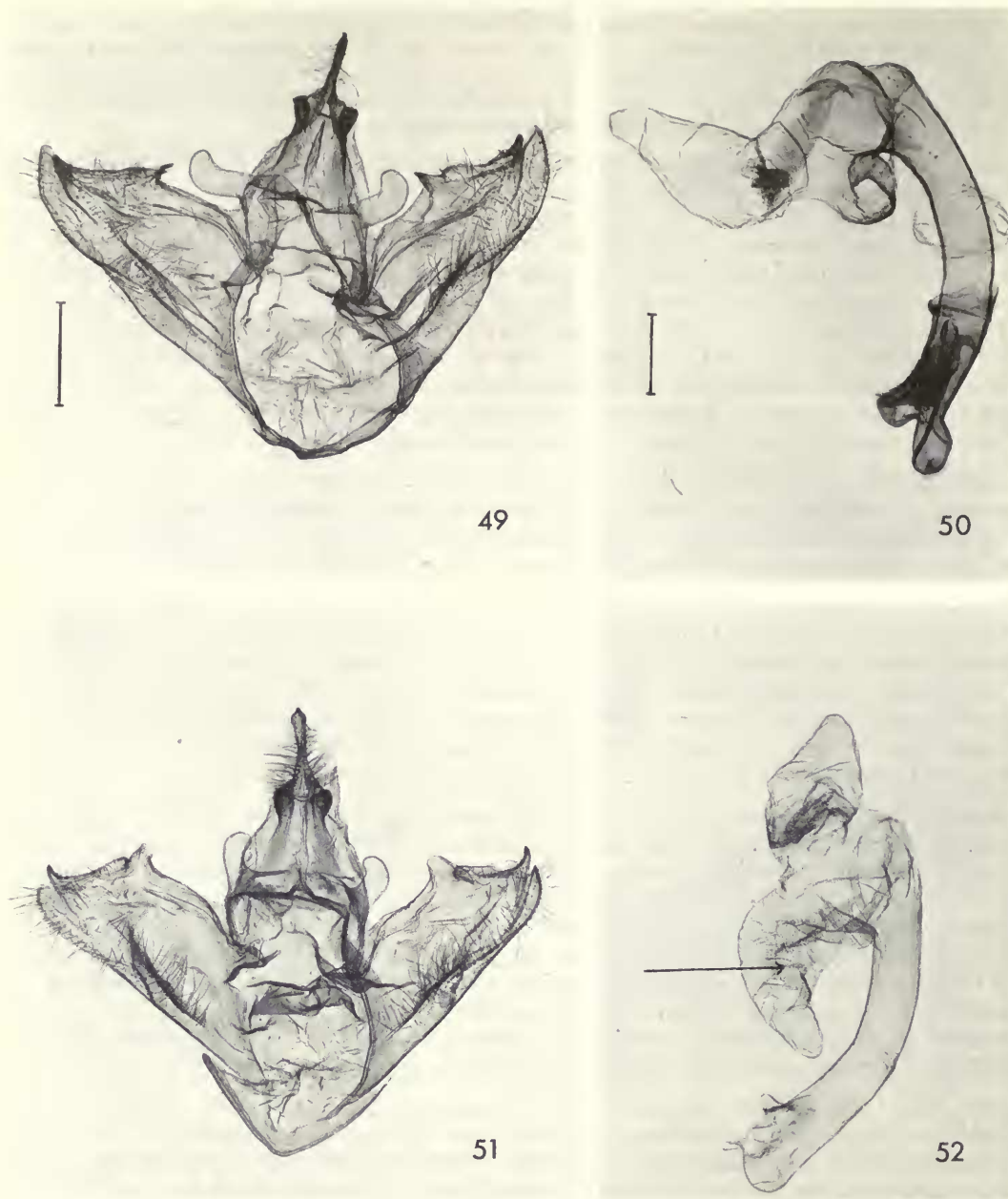
STATUS. Only two (*oslari* and *antiphola*) of the 22 species-group names listed by Travassos (1963: 475–477) as junior synonyms of *tessellaris* are accepted here as such. Reference to the index to this paper will indicate the present status of these names, some of which are reinstated as valid species names and others shown to be junior synonyms of species other than *tessellaris*. None of the illustrations of wings given by Travassos (1963) is of *tessellaris*.

DISTRIBUTION. *H. tessellaris* extends from Canada southwards to Florida and Texas and westwards as far as Arizona. There are no records from the lower Rio Grande valley where *tessellaris* may have been replaced by *schausi* (see p. 26), but there is a single specimen labelled 'Mexico, M. Sallé' in the BMNH.

MATERIAL EXAMINED

Halysidota oslari Rothschild, lectotype ♂, U.S.A.: Colorado, Denver (Oslar) (BMNH).

Canada: Ontario and Quebec. **U.S.A.:** Wisconsin, Iowa, Massachusetts, New York, Pennsylvania, Maryland, West Virginia, Virginia, District of Columbia, North Carolina, Georgia, Florida, Mississippi, Arkansas, Louisiana, Texas, Arizona, Colorado. **Mexico:** 'Mexico'.



Figs 49–52 *Halysidota* ♂ genitalia. (49) *harrisii*, slide 2338, Kentucky. (50) *harrisii*, slide 1138, N.Y. state. (51) *tessellaris*, slide 2337, Wisconsin. (52) *insularis*, USNM slide, St Lucia.

***Halysidota harrisii* Walsh sp. rev.**

(Figs 49, 50)

[*Lophocampa tessellaris* (Smith); Harris, 1841: 260. Misidentification.]
Halesidota harrisii Walsh, 1864b: 430. Type-material lost (see below).

DIAGNOSIS. ♂. Forewing: ♂, 24–26 mm. Not distinguishable externally with certainty from *tessellaris*, but most specimens lack black markings on the basal segment of the palp, whereas in

tessellaris these black markings may be either present or absent. The shape of the valve, in which the saccular process is the longer of the two apical processes, is diagnostic, however, and it is usually possible to examine the valves of a pinned specimen by wetting the surrounding scales. ♀: see *tessellaris*.

The larva is readily separable from that of *tessellaris*. The final instar larva of *harrisii* has a yellow or brown head and chiefly orange anterior dorsal hair-tufts; in *tessellaris* the larval head is black and the hair-tufts black.

TYPE-MATERIAL. Walsh (1864*b*) proposed the name *harrisii* for the 'crested caterpillar' of Harris (1841: 259) (now the 'Sycamore Tussock') stated by Harris to be 'very common, throughout the United States on the button-wood or sycamore'. It is doubtful whether any larva of *harrisii* in Walsh's hands at the time of description exists today, and it would be necessary to establish a neotype if any doubt arose about the identity of *harrisii*.

STATUS. The name *harrisii* is here removed from the synonymy of *tessellaris* in which it was placed by Travassos (1963: 475).

LARVA. Dyar (1891: 163) described the egg, seven larval instars, the pupa and the cocoon of this species. He gave as the foodplant the native North American 'Sycamore' (*Platanus occidentalis*) but quoted the scientific name in error as *Acer pseudo-platanus*, the European Sycamore, which is known in North America solely as an introduced ornamental tree.

DISTRIBUTION. As suggested by Forbes (1960: 21), the distribution of *harrisii* probably coincides with that of its foodplant, which is found in south-eastern Canada, the eastern half of the United States (except for Florida and the Gulf coast) and in parts of north-eastern Mexico (McAlpine & Applefield, 1973).

Halysidota meridionalis Rothschild, **nom. rev., stat. n.**

(Fig. 5)

Halysidota tessellaris meridionalis Rothschild, 1909: 286. LECTOTYPE ♂, MEXICO (BMNH), here designated [examined].

Halysidota tessellaris meridionalis Rothschild; [Rothschild], 1911: pl. 11, figs 34 [lectotype], 35 (good colour-plate).

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 28–31 mm; ♀, 29–31 mm. In Mexico the only species likely to be confused with *meridionalis* is *schausi*, but the latter has a black or partly black clypeofrons, well-marked green margins to the tegulae, an anally dilated medial fascia in most specimens, the fasciae noticeably yellow at the costa, and distinctive male genitalia. (See *tessellaris* for differences between it and *meridionalis*.)

STATUS. Strand (1919: 85) listed *meridionalis* as a 'var.' of *tessellaris* and Travassos (1963: 476) placed *meridionalis* in the synonymy of *tessellaris*. Although the male genitalia of *meridionalis* and *tessellaris* are probably indistinguishable from each other, the difference in size and colour-pattern indicates specific distinctness. Further evidence of the probable specific distinctness of *meridionalis* is provided by a possibly sympatric male (in BMNH) of *tessellaris* labelled 'Mexico', unfortunately without further locality data.

TYPE-MATERIAL. Rothschild (1909: 286) listed three male and two female syntypes from 'Orizaba, Mexico, February 1896' collected by W. Schaus. Only two specimens with precisely these data were present in the Rothschild collection when it was transferred to London: one male and one female. Two other males bear the same data as the latter except for the month of collection which is given as March and April respectively. A second female from the type-locality, collected by Schaus in May, 1896, completes the supposed syntypic series and bears a label in Rothschild's handwriting '*Halysidota tessellaris meridionalis* Rothschild Type'. Technically this so-called type, together with the two males collected in March and April, are not syntypes because their data labels differ in content from the collection data given in the original description, although the

likelihood is that Rothschild failed to realize that his original eight specimens were collected in different months of 1896 and mistakenly listed them all as having been collected in February. The male of the pair of specimens whose data do agree with those given by Rothschild (1909: 286) is chosen, therefore, as the lectotype.

DISTRIBUTION. Mexico.

MATERIAL EXAMINED

Halisidota tessellaris meridionalis Rothschild, lectotype ♂, **Mexico**: Orizaba, ii.1896 (*W. Schaus*) (BMNH). **Mexico**: 1 ♀, S.L.P. [San Luis Potosi], Tamazunchale (AMNH); 1 ♀, S.L.P., El Naranjo (El Salto) [23°47'N 105°22'W] (USNM); 1 ♀, Puebla, Finca San Juan Apulco, near Zacapoaxtla, ix.1971 (LACM); 1 ♂, Vera Cruz, N. Chocoman, vii.1966 (USNM); 1 ♂, 5 ♀ [Vera Cruz], Misantla, vii–ix, 1911 & 1914 (BMNH); 1 ♂, 2 ♀, Vera Cruz, Orizaba, vii, viii.1913 (AMNH); 2 ♂, 2 ♀, [Vera Cruz,] Orizaba, i–v.1896 (including ♀ paralectotype) (BMNH); 1 ♂, [Vera Cruz,] Jalapa (AMNH); 1 ♂, [Vera Cruz,] Jalapa, 30.iv.1913 (ZSBS); 1 ♀, 'Mexico' (AMNH).

Halisidota insularis Rothschild **nom. rev., stat. n.**

(Figs 6, 52)

Halisidota schausi insularis Rothschild, 1909: 285. Holotype ♂, WINDWARD ISLANDS: St Lucia (BMNH) [examined].

Halisidota cinctipes insularis Rothschild; [Rothschild], 1911: pl. 11, figs 32 and 33 [poor figs].

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 23–24 mm; ♀, 24–25 mm. Fully marked specimens of *insularis* closely resemble darkly marked Floridan specimens of *tessellaris* in overall intensity of the coloration (see Fig. 6), but some have abbreviated basal, antemedial, medial and postmedial markings, and all *insularis* specimens differ in having a partly black clypeofrons and black scales on the basal segment of the palp. The longest antennal pectination is about twice the diameter of the antennal shaft at that point – half the length of *tessellaris* pectination. The tymbal organ has fewer microtymbals (14 to 15) than in *tessellaris*. The male genitalia are identical to those of *tessellaris* except for the partly spinose vesica (see Fig. 52).

STATUS. Travassos (1963: 476) placed *insularis* incorrectly in the synonymy of *tessellaris*; the name is here removed from synonymy.

DISTRIBUTION. Known only from St Lucia.

MATERIAL EXAMINED

Halisidota schausi insularis Rothschild, holotype ♂, **Windward Islands**: St Lucia, iv.1890, bred (BMNH).

Windward Islands: 10 ♂, 8 ♀ (including 6 ♂, 7 ♀ paratypes), St Lucia, i–vi.1902–1903 (BMNH, 1 ♂ USNM); 1 ♂, St Lucia, 1 mile [1.6 km] NW. of Soufrière, 18–23.xi.1975 (USNM); 3 ♂, St Lucia, 2 miles [3.2 km] S. of Anse la Raye, 16–19.iv.1972 (LACM); 1 ♂, 1 ♀, St Lucia, Barre de l'Isle, 22.xii.1975 (Toulgoët Coll.).

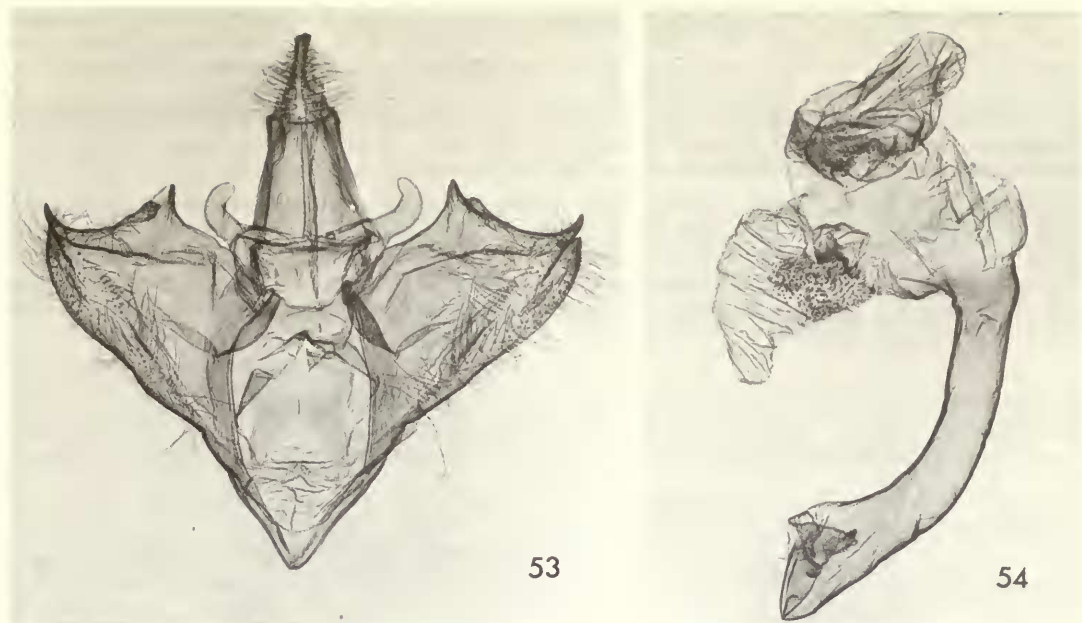
Halisidota ruscheweyhi Dyar **nom. rev., stat. n.**

(Figs 11, 53, 54)

Halisidota schausi ruscheweyhi Dyar, 1912: 52. Lectotype ♂, ARGENTINA (BMNH) [examined].

Halisidota schausi ruscheweyhi Dyar; Watson, 1971: 83, pls 63c & 194c,d [lectotype designation].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–26 mm; ♀, 26–28 mm. Clypeofrons greyish brown, becoming paler towards labrum; dorsal third of clypeofrons and whole of vertex light greyish yellow, slightly bluish green dorsally. Palp greyish yellow; basal and second segment each with black-edged orange-yellow spot. Antenna yellow at base, remainder greyish yellow. Longest antennal pectination (♂) slightly less than three times diameter of shaft at that point. Patagia greyish yellow edged posteriorly with bluish green posterior margin. Tegula greyish yellow, usually with longitudinal black line in middle; fringed medially with bluish green. Rest of thorax dull orange-yellow dorsally, with bluish green mid-dorsal line; greyish yellow laterally and ventrally except for brown area ventral and lateral to eyes. Microtymbal number: 17 to 18. Outer surface of legs orange-yellow, inner surface pale yellow; markings pale yellow edged with black. Forewing pale greyish yellow dorsally; markings slightly darker, edged with black then white costally and elsewhere



Figs 53, 54 *Halysidota ruscheweyhi* ♂ genitalia, slide 2226, Argentina.

proximal to discocellular marking. Dorsal surface of hindwing yellow-white, more strongly yellowish anally; brown apical mark present in two specimens examined. Ventral surface of wings yellowish white, forewing darker; markings of forewing poorly defined except at costa. Abdomen dull orange-yellow dorsally, pale greyish yellow ventrally; trace of brown lateral spots in some specimens.

♂ genitalia. Apical costal process of valve extends distal to apical process of sacculus; non-setose costal process of valve moderately well developed; vincular lobes about three times width at middle; lobes of tegumen spinose, poorly developed; uncus slender. Anterior lobe of vesica conspicuously spinose; longest spine 2.5 times its basal diameter.

REMARKS. Unlikely to be confused externally with any other species of the *tessellaris*-group found in Argentina or Paraguay (*steinbachi*, *nigrilinea*, *tucumanicola* and *brasiliensis*), which have differently patterned wings, or with any other species of its group.

STATUS. *H. ruscheweyhi* is here removed from the synonymy of *tessellaris* in which it was placed by Travassos (1963: 477).

LARVA. [The BMNH possesses a single blown larva collected by Schimpf which was placed in the pre-1915 collection series of *ruscheweyhi* and is provisionally accepted as a specimen of this species.] Hair-tufts of mesothorax mostly long, brownish yellow, with some brown setae and with single white dorsolateral hair tuft on each side. Vestiture of metathorax somewhat damaged but probably similar to that of mesothorax except for the absence of white dorsolateral setae. Segments 1 to 8 of abdomen have dark brown dorsal 'tooth-brush' tufts; long white setae, more numerous on posterior segments, on segments 2 to 9 immediately ventral to spiracle; and longer white setae arise from verruca immediately dorsal to spiracle on segment 8.

DISTRIBUTION. Argentina and Paraguay.

MATERIAL EXAMINED

Halysidota schausi ruscheweyhi Dyar, lectotype ♂, Argentina: Buenos Aires (USNM).

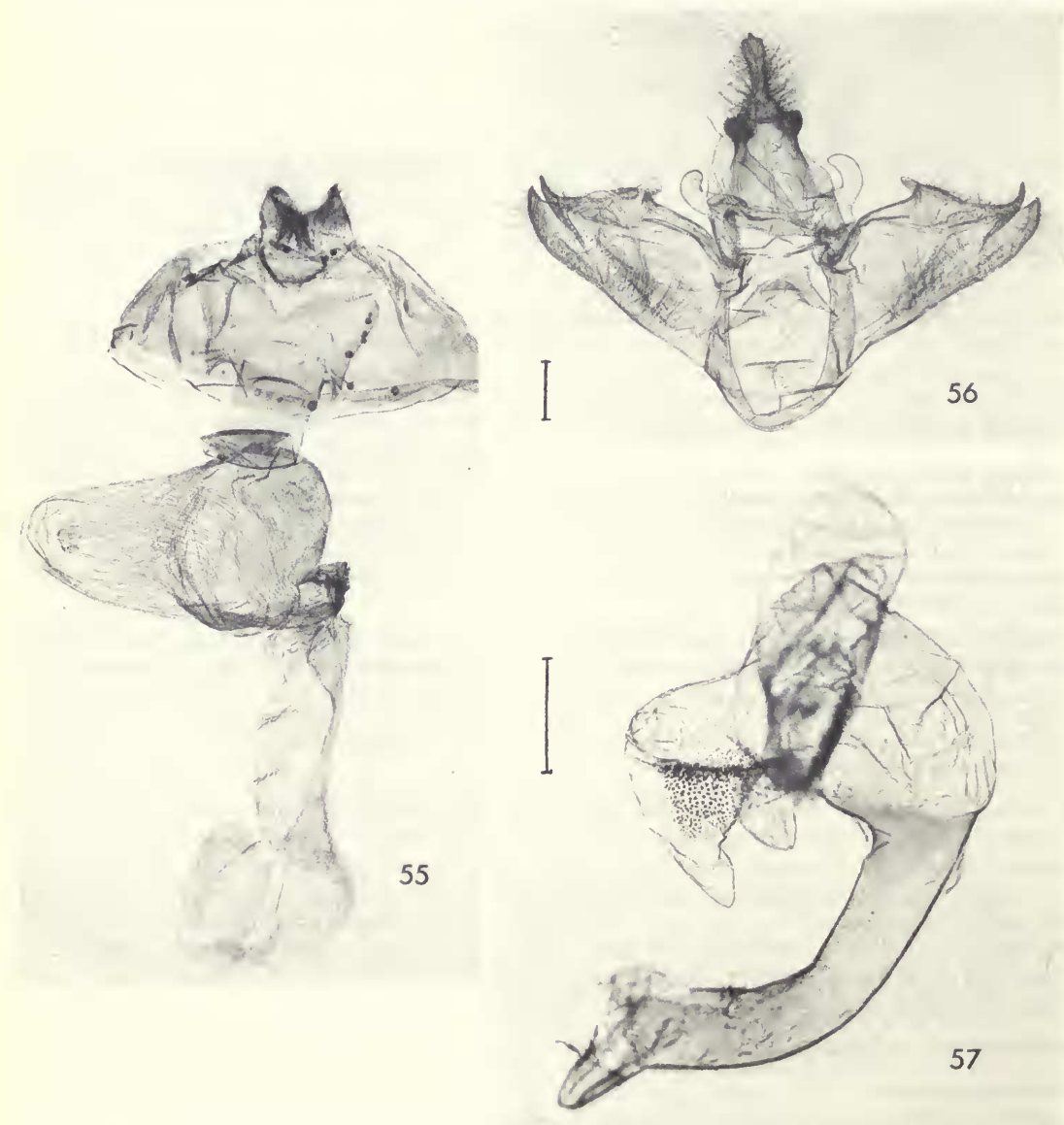
Argentina: 3 ♀, Buenos Aires (USNM); 4 ♂, 4 ♀, Buenos Aires (BMNH); 1 ♂, Buenos Aires state, Platenus, 11.xi (AMNH); 1 ♂, 1 ♀ Tucuman (BMNH). Paraguay: 1 ♀ (USNM).

Halysidota davisii Edwards sp. rev.

(Figs 12, 13, 55–57)

Halesidota davisii Edwards, 1875: 365. LECTOTYPE ♂, U.S.A. (AMNH), here designated [examined].*Halisidota cinctipes* var. *davisii* Edwards; Strand, 1919: 73.*Halisidota cinctipes* ab. *davisii* Edwards; Seitz, 1922: 412 [poor fig.].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–29 mm; ♀, 26–32 mm. Basal and second segment of palp orange-yellow, usually with some black scales; apical segment black, black with white scales, or orange-yellow marked with brown or black. Clypeofrons pale yellow with varying amount of black, or entirely black. Vertex of head pale yellow; distal part of some scales between base of antennae greyish blue-green. Scape, pedicel and basal few segments of antennae orange-yellow; longest antennal pectination (♂) about 2.5 times



Figs 55–57 *Halysidota davisii* genitalia, Arizona. (55) ♀, slide 2190. (56) ♂, slide 2189. (57) ♂, slide 2335.

diameter of shaft at that point. Patagia pale yellow, edged posteromedially with greyish blue-green; tegulae pale yellow, fringed laterally with orange-yellow and medially with greyish blue-green, and with anteromedial black spot or streak in most specimens; rest of thorax orange-yellow with longitudinal greyish blue-green line mid-dorsally. Outer surface of legs orange-yellow, inner surface pale yellow; markings black or, usually, white edged with black. Microtymbal number: 17–18. Forewing pale yellow above; fasciae greyish yellow edged with black, more yellowish costally and at distal end of cell. Basal and antemedial fasciae and postmedial markings abbreviated in some specimens but always present; medial and subterminal fasciae much reduced, absent, or (rarely) well developed; terminal fascia poorly developed except at apex in most specimens, or (rarely) absent or well developed. Under surface of forewing similar to upper surface but more sparsely scaled and fasciae less well defined. Hindwing pale yellow, sparsely scaled except anally; rarely with brown apical marking. Abdomen orange-yellow dorsally, pale yellow laterally and ventrally; each segment with small black dot or streak ventral to spiracle.

♂ genitalia indistinguishable from those of *schausi*. The shape of the uncus and tegumen lobes varies individually to a limited extent.

DIAGNOSIS. The only sympatric species likely to be confused with *davisii* is *schausi*, but the fasciae of *davisii* are generally more heavily marked (though narrower and more abbreviated, especially the subterminal fascia) and the ground-colour of the wings noticeably more opaque.

VARIATION. Specimens collected in Yavapai County, Arizona (Fig. 13) are generally more heavily marked than those examined from elsewhere in the United States or from Mexico. Specimens with the forewing fasciae reduced to much abbreviated basal, sub-basal and postmedial markings occur in Texas (Alpine, Kerrville, Fort Davis) and southern Arizona (Fig. 12).

STATUS. Travassos (1963: 475) apparently intended to place *davisii* in the synonymy of *tessellaris* but did not list *davisii* together with its correct authorship. Seitz's (1922: 412) incorrect relegation of *davisii* to infrasubspecific rank has not been accepted by most subsequent authors.

FOODPLANT. *H. davisii* is not listed by Tietz (1972) whose literature coverage was complete up to 1950 (Ferguson, 1973) and no reference to the foodplant of this species has been found in works published since 1950.

DISTRIBUTION. Specimens have been examined from the states of Utah, Arizona, New Mexico and from north-western Texas. The few Mexican specimens examined were collected in north-western Mexico, three from localities at 6,600 ft [2010 m] or 6,700 ft [2040 m].

MATERIAL EXAMINED

Halesidota davisii Edwards, lectotype ♂, U.S.A.: Arizona [Prescott] (AMNH). (Edwards did not specify how many specimens were included in the original material of this species. The specimen designated as lectotype bears the labels 'Arizona; 5716 Arizona; Type No. AMNH No. 7967 collection Hy Edwards; Halesidota daviesi Hy Ed. Type'.)

U.S.A.: 1 ♂, Utah, Eureka, 4.x.1927 (LACM); 1 ♀, Arizona, Coconino County, 7 miles [11.2 km] W. of Williams, 8–15.viii.1956 (LACM); 15 ♂, 14 ♀, A., Yavapai County, Prescott, 5300 ft [1610 m], 9.vii.–6.viii.1970–1972 (LACM, BMNH); 1 ♂, A., Yavapai County, vii.1910 (CM); 2 ♀, A., Yavapai County, Seligman, 16.vii.1956, 18.viii.1960 (LACM); 14 ♂, 18 ♀, A., Santa Rita Mts, Madera Canyon, 5000 ft [1520 m], 8.vii.–4.ix.1947–1971 (LACM, BM); 1 ♂, A., Pima County, Santa Rita Mts, Box Canyon, 20.vi.1959 (LACM); 2 ♂, 2 ♀, A., Santa Cruz County, Oro Blanco Mts, 1 mile [1.6 km] S. of Pena Blanca Lake, 4000 ft [1220 m], 19.viii.1971 (BMNH); 1 ♂, A., Oro Blanco Mts, Pena Blanca Lake, 10 miles WNW. of Nogales, 3700 ft [1130 m], 25.vii.1971 (LACM); 6 ♂, 2 ♀, A., Oro Blanco Mts, Pena Blanca Canyon, 2.viii.1960 (LACM); 5 ♂, A., Santa Cruz Co., Nogales, 22.vii.–13.viii.1957–1958 (1 ♂ in PAS, rest in LACM); 1 ♂, A., 4 miles [6.4 km] N. of Nogales, 13.viii.1955 (LACM); 1 ♂, A., Santa Cruz Co., Patagonia Mts, Washington Camp, 26.v.1972 (AMNH); 1 ♀, A., Santa Cruz Co., Baboquivari Mts, Brown Canyon, 28.vii.1959 (LACM); 2 ♂, 1 ♀, A., Cochise County, Chiracahua Mts, S.W. Research Station, 5400 ft [1640 m] (USNM, LACM, AMNH); 1 ♂, A., Cochise Co., 'Cave Cr Cyn', Stewart Camp, 5400 ft [1640 m], 31.vii.1972 (LACM); 2 ♂, 1 ♀, A., labelled 'Arizona' (USNM, BMNH); 1 ♂, New Mexico, Eddy County, Sitting Bull Falls, 42 miles [67.6 km] SW. of Carlsbad, 4800 ft [1460 m], 28.vi.1964 (AMNH); 1 ♀, N.M., Eddy Co., Guadalupe Mts, Guadalupe Canyon, 14.viii.1967 (LACM); 1 ♂, N.M., Hidalgo County, Granite Pass, 5.viii.1967 (LACM); 1 ♂, N.M., [Luna County,] Deming, 8.vii.1915 (LACM) (this specimen labelled 'Texas, N' in error); 1 ♂, 2 ♀, Texas, Jeff Davis County, Fort Davis, 24–30.vii.1964–1975 (LACM);

2 ♂, 4 ♀, T., Jeff Davis Co., Limpia Canyon, near Fort Davis, 4.v.-8.viii.1961-1974 (LACM); 1 ♂, T., Brewster County, Big Bend (USNM); 2 ♂, 3 ♀, T., Brewster Co., Chisos Mts, Big Bend National Park, Green Gulch, 16-27.viii.1964-1969 (LACM, AMNH, Toulgoët); 2 ♂, T., Brewster Co., Chisos Mts, Big Bend National Park, Big Bend Basin, 6.v.-25.viii.1964-1965 (LACM); 2 ♂, 4 ♀, T., Brewster Co., Alpine, 1-2.vi.-7.viii.1925 (BMNH, LACM); 3 ♂, T., [Kerr County,] Kerrville, viii-ix.1901-1904 (LACM). Mexico: 1 ♂, Chihuahua, 16 road miles [25.7 km] SW. of Colonia Juarez, 6600 ft [2010 m], 18.viii.1976 (LACM); 2 ♂, Sinaloa, 1.1 road miles [1.7 km] W. of El Palmito, 6700 ft [2040 m], 26.viii.1976 (LACM); 1 ♂, Sinaloa, 44 miles [70.7 km] E. of Villa Union, 27.viii.1960 (LACM).

Halisdota schausi Rothschild sp. rev.

(Figs 7-10)

Halisdota schausi Rothschild, 1909: 284. Lectotype ♂, COLOMBIA (BMNH) [examined].

Halisdota schausi Rothschild; [Rothschild], 1911: pl. 11, figs 21, 22 [fig. 21 probably represents lectotype].

Halisdota schausi Rothschild; Hampson, 1920: 286 [lectotype designation].

Halisdota schausi pallida Rothschild, 1909: 285. Lectotype ♂, MEXICO (BMNH) [examined]. [A junior secondary homonym of *Phaegoptera pallida* Schaus, 1901: 267.]

Halisdota schausi pallida Rothschild; [Rothschild], 1911, pl. 11, figs 14, 15.

Halisdota schausi pallida Rothschild; Hampson, 1920: 286 [lectotype designation].

Halisdota schausi v. *mexiconis* Strand, 1919: 416. [Replacement name for *pallida*.] **Syn. n.**

DESCRIPTION. ♂ and ♀. Forewing: ♂, 21-32 mm; ♀, 25-33 mm. Clypeofrons pale yellow or brownish yellow ventrally, black or brown dorsally (this dark area restricted to a narrow transverse band in some specimens but extending over most of clypeofrons in others); vertex of head pale yellow; suffused with greenish blue in some specimens. Basal segment of palp orange-yellow with varying degree of black or black and greyish white scaling proximally; second segment orange-yellow, with black or black and greyish white scales proximally and distally; apical segment black, or black and greyish white. Antennae orange-yellow dorsally; largest antennal pectination (♂) 2.5 times diameter of antennal shaft at that point. Patagia pale yellow, fringed posteriorly with greenish blue. Tegulae pale yellow, each with black longitudinal stripe and fringed posteriorly and medially with greenish blue. Rest of thorax orange-yellow, except for brown patch posterior to eye and at anterolateral corner of tegula and greenish blue dorsal line. Legs yellow, with brown- or black-edged pale yellow markings. Microtymal number: 10 or 11. Forewing pale yellow above; black-edged markings yellowish brown, except for discocellular marking and costal part of all fasciae except terminal which are orange-yellow; under surface paler, more greyish. Hindwing yellowish white, becoming more yellowish anally; small dark apical marking present in few specimens. Abdomen orange-yellow dorsally, pale yellow laterally and ventrally; black posterolateral spot present on each side of segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical costal processes of valve extend distal to apical process of sacculus; non-setose mid-costal process moderately well developed, its posterior margin continuous with distal part of costal margin of valve; vincular lobes about three times least width; lobes of tegumen strongly developed and densely setose; uncus dilated before apex or parallel-sided. Tapered anteroventral lobe of vesica spinose dorsally, with small accessory lobe at ventral angle and larger, basally scobinate lobe arising from the spinose area.

DIAGNOSIS. In North America, *schausi* could be confused only with well-marked *davisii*, but the ground-colour of the wings of *schausi* is much less opaque and the markings paler but more distinctly yellow than in *davisii*. (The male genitalia are apparently indistinguishable from those of *davisii*.) The South American *yapacaniae*, *brasiliensis* and *tucumanicola* could be mistaken externally for *schausi* but are not known to be sympatric with *schausi* and have readily distinguishable male genitalia.

RIO GRANDE FORM. Forewing: ♂, 24-27 mm; ♀, 25-28 mm. A batch of 32 specimens from the United States' side of the lower Rio Grande Valley, and four from neighbouring areas of Mexico are tentatively identified as specimens of *schausi*. These Texan and Mexican specimens are uniformly darker than normal *schausi*, having a more brownish ground-colour and more greyish fasciae, but no differences in the genitalia have been found. Along the Rio Grande they may represent a local isolate, restricted to an area of lush vegetation surrounded by desert scrub which extends along the river valley from near the town of Mission to the coast (Porter, 1977). Normal *schausi* have been examined from further north in Texas (Harris Co.).

INDIVIDUAL VARIATION. This is particularly evident on the forewing where the subterminal fascia may be reduced to unconnected spots in a few specimens (Fig. 9) and the antemedial fascia interrupted in the cell or absent anterior to the cell as in one Texan specimen. Specimens also vary in the extent to which the fasciae are edged with black or dark brown and in the general coloration of the fasciae.

STATUS. Travassos (1963: 476) wrongly synonymized *schausi* and *pallida* with *tessellaris*. Both *pallida* and *schausi* were described by Rothschild in the same paper, the former as the Mexican subspecies of *schausi*. Rothschild's original series of *pallida* from two Mexican localities comprised specimens which were either worn, or were slightly paler and less well marked than typical Mexican *schausi* (as in the occasional specimen from South America). *H. pallida*, and its replacement name, *mexiconis*, must therefore be placed in the synonymy of *schausi*.

None of the other four so-called subspecies of *schausi* described by Rothschild (1909: 285) (*insularis*, *tucumana* [now *tucumanicola* Strand], *meridensis* and *brasiliensis*) is now recognized as such.

Strand (1919: 416) replaced the name *pallida* Rothschild, 1909, which is preoccupied by *Halisidota pallida* Schaus (1901: 267), by *Halisidota schausi* v. *mexiconis*.

AFFINITIES. See *yapacania* and *brasiliensis*, which are possible vicariants of *schausi*.

FOODPLANTS. Silva *et al.* (1968: 217) list *Cestrum nocturnum* (Solanaceae) as a foodplant of the larva. An adult specimen in the USNM is labelled 'on Hackberry' (*Celtis*, Ulmaceae).

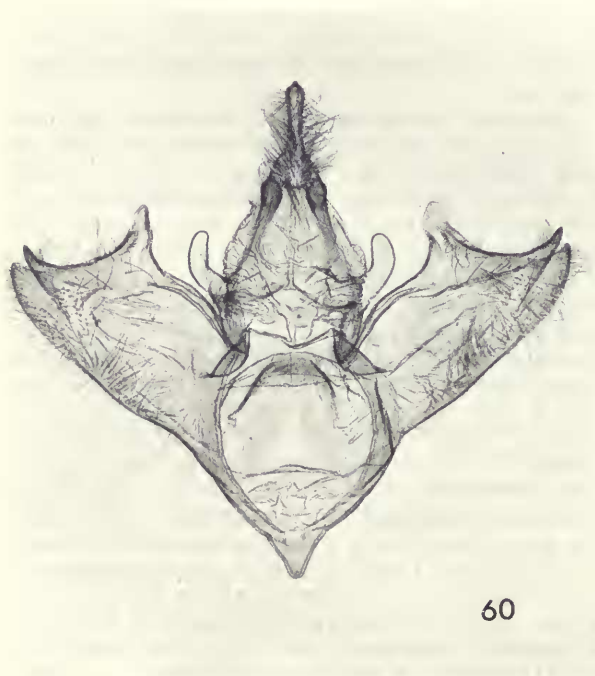
DISTRIBUTION. The range of *schausi* extends from Texas through Mexico and Central America (but not the Antilles) to Colombia, Venezuela, Ecuador and Peru.

MATERIAL EXAMINED

Halisidota schausi Rothschild, lectotype ♂, **Colombia**: Popayan (BMNH). *Halisidota schausi pallida* Rothschild, lectotype ♂, **Mexico**: Cuernavaca (BMNH).

Rio Grande form. U.S.A.: 22 ♂, 5 ♀, Texas, Cameron County, Brownsville, 24.ii.–10.iii. 1925, 1967 (AMNH, BMNH, TAM, USNM); 1 ♀, T., Brownsville, Southmost, Palm Grove Sanct[uary], 3–6.v.1975 (LACM); 2 ♀, T., Hidalgo County, Weslaco, 18–21.iii.1953 (TAM); 1 ♂, 1 ♀, T., Hidalgo County, Mercedes, 3.ix.1958, 1969 (AMNH). **Mexico**: 1 ♀, SLP (San Luis Potosi), El Salto Falls (AMNH); 1 ♂, San Luis Potosi, 2 miles [3.2 km] SW. of Tamazunchale, San Isidro (AMNH); 1 ♂, NL [Nuevo Leon], 2 miles [3.2 km] S. of Monterrey, Chipinque Mesa, 4200 ft [1150 m], 10.viii.1963 (USNM); 1 ♂, NL [Nuevo Leon], 3 miles [4.8 km] E. of Galeana, 5000 ft [1500 m], 7–9.viii.1963 (USNM).

Pale (normal) form. U.S.A.: 1 ♂, Texas (USNM); 1 ♂, T., Harris County (CM); 1 ♂, 1 ♀, 'Texas' (NAS). **Mexico**: numerous specimens from the following states have been examined; San Luis Potosi, Queretaro, Hidalgo, Vera Cruz, Puebla, Morelos (including 1 ♂ paralectotype of *Halisidota instabilis* Dyar), Sinaloa, Jalisco, Michoacan, Guerrero, Oaxaca and Chiapas (BMNH, LACM, USNM, AMNH, ZSBS, TAM, AM, NAS, Toulgoët). **Guatemala**: 1 ♂, 3 ♀, Guatemala City (BMNH); 1 ♀, Chejel (BMNH); 1 ♂, 1 ♀ Huehuetenango, c. 1000 m (BMNH); 100 ex., Depto Zacapa, La Union, viii.–xi.1972 (LACM); 1 ♀, Municipio Coban, Chajsel, 1400 m, i.1973 (LACM); 2 ♂, 1 ♀ 'Gautemala' (MNH). **Honduras**: 2 ♂, Cortes, Lago Yojoa, 18 km NE. of El Mochito, 20–21.viii.1974 (LACM). **Nicaragua**: 15 ♂, 8 ♀, Managua State, Las Nubes, 1300 ft [400 m], 21–26.x.1971 (LACM). **Costa Rica**: 3 ♂, 7 ♀ (BMNH); 3 ♀, Candelaria Mts (BMNH); 3 ♂, 1 ♀, San José, vi.1937 (BMNH, LACM, MNHN); 1 ♂, San José Province, 14 km N. of San Isidro del General, Pan. Am. Highway, 1600 m, 20–23.vi.1974 (BMNH); 3 ♂, 1 ♀, Punterenas Province, Monteverde, 1400 m, 27.ii.–16.vi.1972, 1974 (LACM, BMNH); 1 ♀, Turrialba (LACM); 1 ♀, 'Costa Rica' (MNH). **Colombia**: 10 ♂, Cundinamarca Province, Monterredondo, 1420 m (ZSBS); 1 ♂, Upper Rio Negro, 800 m (BMNH); 1 ♀, near Cali, 5.x.1969 (Toulgoët). **Venezuela**: 1 ♂, 1 ♀, Arugua, Rancho Grande, near Maracay, 1100 m, 12.vii.–16.viii.1976 (BMNH, LACM); 3 ♂, 6 ♀, Caracas (BMNH); 1 ♀, Valencia (BMNH); 1 ♀, La Victoria, 1700 m, 8.vii.1963 (ZSBS); 1 ♀ La Puerta (UCV); 1 ♀, San Esteban, vi.1909 (BMNH); 1 ♀, Las Quigas, near San Esteban (BMNH); 1 ♂, Aroa (USNM); 14 ♂, 14 ♀, Mérida (BMNH, MNHN, USNM, ZSBS); 2 ♂, 6 ♀, 'Venezuela' (BMNH). **Ecuador**: 1 ♀, Guayaquil (USNM); 1 ♂, Tinalandia, near Santo Domingo, 700 m, 16.–19.vi.1977 (ZSBS); 1 ♀, Hazienda Piman, 2200 m, 2–4.vi.1977 (ZSBS). **Peru**: 2 ♂, 5 ♀, Lima (BMNH); 2 ♂, 1 ♀, Callao (BMNH); 1 ♂, Chanchamayo, La Merced (USNM).



Figs 58-61 *Halysidota* ♂ genitalia. (58, 59) *brasiliensis*, slide 2256, Brazil, São Paulo. (60, 61) *yapacaniae*, CM slide, Bolivia.

Halysidota brasiliensis Rothschild **nom. rev., stat. n.**

(Figs 14, 58, 59)

Halysidota schausi brasiliensis Rothschild, 1909: 285. Holotype ♀, BRAZIL (BMNH) [examined].*Halysidota schausi brasiliensis* Rothschild, [Rothschild], 1911: pl. 11, fig. 5 [good fig. of worn type].

DIAGNOSIS. ♂ and ♀. Forewing: ♂, 27–29 mm; ♀, 28–32 mm. Similar in external characters of the head and appendages, thorax, legs and abdomen to *schausi*, but the yellow coloration is darker and more orange in tone. On the upper surface of forewing, the ground-colour is similarly darker than in well-marked *schausi*, the dark edges of the fasciae are accentuated by the noticeably paler ground-colour of the wing immediately adjacent to the fasciae, and the yellow costal parts of the fasciae are a more brownish yellow. The male genitalia differ from those of *schausi* in the shape of the mid-costal non-setose lobe of the valve, the smaller weakly spinose lobes of the tegumen and in the smaller accessory lobe on the left-hand side of the tapered anterior lobe of the vesica.

The Brazilian *pearsoni* is similar in size, but has dark costal markings on the forewing and in the male genitalia has shorter vincular lobes and distinctively shaped valves (see Figs 17, 64, 65).

Argentinian specimens of *brasiliensis* are probably not distinguishable externally from *tucumanicola* but can be separated in the male by the relative lengths of the apical processes of the valve (see Fig. 58).

STATUS. Travassos (1963: 476) wrongly placed *brasiliensis* in the synonymy of *tessellaris* from where it is here removed.

AFFINITIES. The external and male genitalic differences between *brasiliensis* and *schausi* militate against the possibility of a subspecific relationship, but allopatry and the overall similarity of these two species suggest that one may be a vicariant of the other although I can find no supporting synapomorphies.

FOODPLANT. Silva *et al.* (1968: 217) list *Phrygilanthus acutifolius* (Loranthaceae) and d'Almeida (1929) cites *Trema micrantha* (Ulmaceae).

DISTRIBUTION. The few available specimens examined were collected in south-eastern Brazil and adjacent Paraguay. A male specimen in the BMNH anomalously labelled 'La Rioja, Tucuman, Argentine' (both La Rioja and Tucuman are states of Argentina) plus 5 ♂ and 10 ♀ from Tucuman have not been listed below; they differ from the other material examined in the slightly larger spines on the anterior lobe of the vesica, and may represent a distinct subspecies (1 ♂ and 1 ♀ are paralectotypes of *tucumanicola*).

MATERIAL EXAMINED

Halysidota schausi brasiliensis Rothschild, holotype ♀, **Brazil**: Paraná, Castro (BMNH).

Brazil: 1 ♂, Bahia (BMNH); 2 ♂, São Paulo (BMNH); 1 ♀, Paraná, Castro, ix.1933 (BMNH); 1 ♂, 1 ♀, [Paraná,] Ponta Grossa, ix.1958 (UFP); 1 ♀, [Rio de Janeiro,] Corcovado Forest, 1958 (BMNH); 1 ♀, [Rio Grande do Sul,] Nova Teutonia [27°03'S, 52°24'W] (AMNH). **Paraguay**: 3 ♂, 2 ♀, Villarrica, iii.–xi.1922 (USNM, BMNH); 1 ♀, central; 1 ♀, 'Paraguay'.

Halysidota yapacaniae sp. n.

(Figs 15, 60, 61)

DESCRIPTION. ♂. Forewing: ♂, 27–29 mm. In coloration and colour-pattern probably indistinguishable from fully marked specimens of *schausi*, but with shorter antennal pectinations (longest pectination, ♂, 1.5 times diameter of shaft at that point).

♂ genitalia. Spatulate non-setose mid-costal lobe strongly developed; valve apex as for *schausi*; vincular lobes three times as long as least width; lobes of tegumen only moderately developed, minutely and inconspicuously spinose; uncus dilated before acuminate uncus; vesica as for *schausi* but anterior lobe slightly shorter in specimens examined.

♀ not known.

AFFINITIES. Overall similarity suggests that *yapacaniae* is a derivative of *schausi*, which it replaces in the eastern Andes of Bolivia and further eastwards in Bolivia. Judging from the altitude at which the type and two of the paratypes were collected, they were probably captured at a point on the Yapacani River west of Santa Cruz. The remaining paratype is labelled 'Prov. del Sara, Bolivia, 450 m., J. Steinbach' but no province by that name exists and the town of Sara (20°17'S, 65°50'W) is the possible place of capture of this specimen.

DISTRIBUTION. Known only from Bolivia.

MATERIAL EXAMINED

Holotype ♂, **Bolivia**: E., R[io,] Yapacani, 600 m, ii.1915 (*J. Steinbach*) (CM).

Paratypes. **Bolivia**: 2 ♂, data as holotype (CM, BMNH); 1 ♂ Sara ('Prov. del Sara'), 450 m, viii.1914 (*J. Steinbach*) (CM).

Halisdota tucumanicola Strand **nom. rev., stat. n.**

(Figs 16, 62, 63)

Halisdota schausi tucumana Rothschild, 1909: 285. **LECTOTYPE** ♂, ARGENTINA (BMNH), here designated [examined]. [Primary junior homonym of *Halisdota tucumana* Rothschild, 1909: 280.]

Halisdota schausi tucumana Rothschild; [Rothschild], 1911: pl. 11, figs 16, 17 [fig. 16 probably represents the type; both figs are too dark].

Halisdota cinctipes v. *tucumanicola* Strand, 1919: 416. [Replacement name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26 mm; ♀, 27–30 mm. Clypeofrons brownish yellow ventrally, dark brown or black dorsally; vertex pale yellow, the tips of scales between and posterior to antennae tinged with greenish blue. Basal segment of palp yellow distally, black and greyish white at base; second segment black at distal margin, black and greyish white basally, yellow at middle; apical segment black with few greyish white scales. Antenna orange-yellow dorsally; largest antennal pectination (♂) between 2.5 and 3.0 times diameter of shaft at that point. Patagia pale yellowish brown, edged posteriorly and medially with greenish blue. Tegulae pale yellowish brown with greenish blue posterior and medial fringe and dark brown longitudinal streak in middle. Rest of thorax orange-yellow dorsally with greenish blue longitudinal mid-dorsal line, orange-yellow laterally except for brown area posterior to patagia and eyes, pale yellow ventrally. Legs yellow with black, brown and greyish white markings. Microtymbal number: 13. Forewing pale yellow above, palest adjacent to fasciae; fasciae yellowish brown except for yellow costal elements and yellow discocellular marking; veins dark brown in fasciate areas of wing; undersurface paler, more greyish. Hindwing yellowish white, more intensely yellowish anally and at outer margin; apex with small brown marking in most specimens examined. Abdomen orange-yellow dorsally, pale brownish yellow laterally and ventrally; black lateral dash or spot on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apex of sacculus extends distal to apical process of costa; non-setose mid-costal process short, contorted. Vincular lobes short, broader than long; lobes of tegumen poorly developed, spines just visible at $\times 32$; uncus weakly dilated before acuminate apex. Anterior lobe of vesica with two accessory dorsal lobes and larger ventral lobe; this anterior region scobinate except for apex and right-hand side of ventral lobe and becoming spinose at base of ventral lobe; posterior lobe of vesica minutely scobinate.

DIAGNOSIS. Probably not distinguishable from Argentinian specimens of *brasiliensis* externally, but easily distinguished by the male genitalia. Similar also to well-marked specimens of *schausi* (not yet recorded from Argentina) but fasciae a darker greyish colour and inner margin of terminal fascia markings more strongly convex, and in the male genitalia the shape of the valve and the smaller lobes of the vinculum and tegumen are distinctive. The male genitalia are similar to those of *pearsoni* but in colour-pattern these two species are unlikely to be confused (see *pearsoni*). (The illustration in Seitz (1922: pl. 59 'tucumana') is reasonable except for the excessively dark veins.)

STATUS AND HOMONYMY. Travassos (1963: 476) wrongly placed *tucumanicola* (as *tucumana* Rothschild) in the synonymy of *tessellaris*, an error which is now corrected.

Halisdota tucumana Rothschild (1909: 280) has priority over *H. schausi tucumana* Rothschild (1909: 285) because the former was proposed as the name of a species and the latter as the name of a subspecies (Article 57e of the *Code*). Strand (1919: 416) replaced the junior homonym with *tucumanicola*.

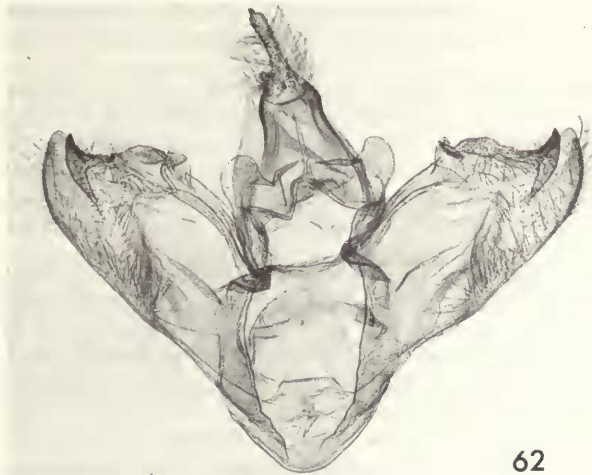
FOODPLANTS. Hayward (1969: 13) listed *Celtis* spp., 'especially *Celtis spinosa*', and a *Trema* species (both Ulmaceae) as foodplants of *schausi*. *H. schausi* does not occur in Argentina and Hayward's comments could therefore refer to the similarly patterned *tucumanicola* or to *brasiliensis*.

DISTRIBUTION. Argentina.

MATERIAL EXAMINED

Halisidota schausi tucumana Rothschild, lectotype ♂, **Argentina**: Tucumán, 1903 (*J. Steinbach*) (BMNH). **Argentina**: 1 ♂, 2 ♀, Tucumán (BMNH) (including 2 ♀ paralectotypes); 10 ♂, Prov. Tucumán, Parque Sierra San Javier, Horco Molle, 700 m, 22, 24.xi.1973; 15.ii.1974 (LACM); 1 ♀, Prov. Tucumán, 28.xii.1950 (ZSBS); 1 ♂, 1 ♀, Prov. Jujuy, Yala, 1450 m, 20.ii.1955 (ZSBS); 1 ♀, Buenos Aires, Punta Lara, 12.xi.1951 (ZSBS).

Doubtfully identified material. **Argentina**: 8 ♀, Prov. Tucumán, Parque Sierra San Xavier, Horco Molle, 700 m, 24, 25.xi.1973 (LACM).



62



63



64



65

Figs 62-65 *Halisidota* ♂ genitalia. (62, 63) *tucumanicola*, slide 2194, Argentina. (64) *pearsoni* paratype, slide 2222, Brazil, Sta Catarina. (65) *pearsoni* paratype, UFP slide, Brazil, Sta Catarina.

Halysidota pearsoni sp. n.

(Figs 17, 64, 65)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 27–31 mm; ♀, 30–33 mm. Clypeofrons entirely greyish brown, or greyish brown becoming greyish yellow ventrally; vertex of head yellowish brown tinged with bluish green. Palp clothed with black and greyish white scales; distal part of basal segment orange-yellow laterally; second segment with orange-yellow spot laterally. Antennal shaft yellow dorsally towards base, brown distally; longest antennal pectination (♂) three times diameter of antennal shaft at that point. Patagia yellowish grey but discocellular and costal markings more yellowish; under surface pale, more greyish. Hind greenish blue and with short brown longitudinal streak in middle; rest of thorax orange-yellow except for greenish blue dorsal line and greyish brown at anterolateral corner of tegula and in narrow band posterior to eye, palest ventrally. Legs orange-yellow on outer surface, pale yellow on inner surface; markings black and greyish white edged with black. Microtymbal number: 15. Forewing pale greyish yellow above; fasciae yellowish grey but discocellular and costal markings more yellowish; under surface pale, more greyish. Hind wing pale orange-yellow, most intensely coloured anally and at outer margin; small dark brown marking present at apex of wing in holotype and most specimens examined. Abdomen orange-yellow dorsally, pale greyish yellow ventrally; black lateral spot present on each side of segments 3–8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical processes of each valve extending to about same distance from base of valve in opened position; setose costal process of valve prominent; vincular lobes short, either as broad as long or slightly longer than broad; lobes of tegumen poorly developed, spines just visible at $\times 32$ magnification; uncus weakly dilated before apex. Anterior lobe of vesica scobinate except along ventral surface, with accessory lobe on left-hand side dorsally near apex and long, transverse, bilobate lobe near its base; this elongate lobe bearing short spines ventrolaterally; posterior lobe of vesica minutely scobinate.

DIAGNOSIS. Externally most like the sympatric *brasiliensis*, but readily separable by the generally darker discocellular and costal markings on the forewing and by the usually narrower medial fascia. The genitalia are similar to those of *tucumanicola*, but the setose costal process of the valve is more prominent and the apical processes of about equal length. Distinguished from the more northerly *underwoodi* by the absence of dark scales on the veins crossing the subterminal and terminal fasciae on the upper surface of the forewing.

AFFINITIES. Similarities in the male genitalia, particularly the similarly shaped lobes of the vesica, suggest a close relationship between this species and *tucumanicola*, but none of these character states can be accepted as apomorphic.

DERIVATION OF NAME. Named after Mr H. R. Pearson, a good friend of the BMNH for many years.

DISTRIBUTION. Brazil and possibly Paraguay (see below).

MATERIAL EXAMINED

Holotype ♂, **Brazil**: Santa Catarina, Jaragua do Sul (*F. H. Hoffman*) (BMNH).

Paratypes. **Brazil**: 13 ♂, 2 ♀, Santa Catarina, Jaragua do Sul, vii, viii, ix.1932, 1935 (BMNH); 3 ♂, Santa Catarina, Rio Vermelho, 830 m, vi, vii.1936, 28.ix.1973 (BMNH); 4 ♂, Santa Catarina, Hansa Humboldt, 60 m, vii.1936 (BMNH); 2 ♂, Santa Catarina, hills between Hansa [Humboldt] and Jaragua [do Sul], 400 m, vii.1935 (BMNH); 2 ♂, Santa Catarina, Bento do Sul, Rio Vermelho, 850 m, 24.viii.1973 (UFP); 1 ♂, Santa Catarina, Joinville, viii.1922 (USNM); 1 ♂, [Rio Grande do Sul,] Nova Teutonia, 27°11'S, 52°23'W (Toulgoët Coll.); 1 ♀, Paraná, Morretas, Marumbi, 500 m, 17.vii.1966 (UFP); 1 ♀, [Minas Gerais,] Uberaba (BMNH); 1 ♂ [Minas Gerais,] Campo Belo (USNM); 1 ♀, Paraná, Castro, 950 m (BMNH); 4 ♂, 2 ♀, Rio State, Magé, Guapi-mirim (Caneca Fina, Rio Sucavao), 160 m, 19.vi.–29.x.1960–1973 (BMNH); 1 ♀, Rio State, Angra dos Reis, 700 m, 1–2.xi.1951 (BMNH); 1 ♂, Rio State, Teresopolis, 13–22.iii.1958 (BMNH); 1 ♂, Rio State, Itatiaia, 900 m, 14.ix.1952 (BMNH); 1 ♀, Rio State, Teresopolis, Barreira, 400 m, 26–29.iv.1957 (BMNH); 1 ♀, Rio de Janeiro; 1 ♀, São Paulo, Faz[enda] da Pedra, Rio Tamandua, Ribeirão Beto (BMNH); 1 ♀, São Paulo (ZSBS); 1 ♂, Campinas, Goiás (Goyaz), i.1934 (BMNH); 2 ♂, Espírito Santo, Santa Teresa, 2.ii.1964 (UFP); 1 ♂, Pernambuco, Serra de Comonati (Communitaty), 1.ii.1893 (BMNH).

Non-paratypic material. **Paraguay**: 3 ♂, Villarica, v, vii, x.1922, 1951 (AMNH, BMNH).

Halysidota steinbachi Rothschild sp. rev.

(Figs 18, 66, 67)

Halysidota steinbachi Rothschild, 1909: 283. LECTOTYPE ♂, ARGENTINA (BMNH), here designated [examined].

Halysidota steinbachi Rothschild; Rothschild, 1911: pl. 11, figs 25, 26 (fig. 25 is of lectotype).

DESCRIPTION. ♂ and ♀. Forewing: ♂, 25–27 mm; ♀, 22–28 mm. Ventral two-thirds of clypeofrons dark brown, becoming paler towards labrum; vertex and dorsal third of clypeofrons pale yellowish grey-brown. Proximal part of each segment of palp clothed with mixture of dark brown and light brown scales; distal parts of segments orange-yellow. Scape of antenna pale yellowish brown proximally, yellow distally; base of shaft yellow dorsally. Longest antennal pectination (♂) slightly less than twice diameter of shaft at that point. Patagia and tegulae pale yellowish grey-brown; tegulae fringed medially with bluish grey, laterally with yellow, and with central black longitudinal streak; remainder of thorax orange-yellow dorsally and laterally, with bluish grey mid-dorsal line, and brown area at anterolateral corner of each patagium; pale yellow ventrally except for small brown patch ventral to eye. Microtymal number: 13 to 15. Outer surface of legs orange-yellow, inner surface pale yellowish grey-brown; markings pale grey edged with dark brown. Forewing thinly scaled above, pale brownish yellow, palest at costa; markings brownish grey except for costal part of fasciae and whole of discocellular markings which are greenish yellow; fasciae bordered with black, then greyish white. Under surface of forewing paler; medial, subterminal and terminal fasciae pale brownish grey becoming pale yellow at costa; discocellular marking brown, continuous with pale brownish yellow costal marking; basal and antemedial fasciae pale brownish yellow becoming brown at costa. Hindwing pale yellow with small brownish grey apical marking on both surfaces of wing. Abdomen brownish orange-yellow dorsally, pale yellow ventrally, with black lateral dash on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Acuminate, arcuate, apical costal process of valve distinctly longer than apical process of sacculus. Non-setose process of costa prominent. Vincular lobes about 2.5 times as long as width at middle. Lobes of tegumen small; spines just visible at $\times 32$. Lobes of vesica similar to those of *schausi*.

DIAGNOSIS. Distinguished externally from Argentinian *tucumanicola* and *brasiliensis* by the yellowish grey-brown colour of the vertex, patagia and tegulae and by the dull brownish ground-colour of the forewing. The Peruvian *conflua* is similar in coloration, not colour-pattern, but differs in the shape of the valve and tegumen in the male genitalia.

STATUS. Travassos (1963: 476) incorrectly placed *steinbachi* in the synonymy of *tessellaris*; it is here removed from synonymy as the valid name of a distinct species.

FOODPLANTS. Hayward (1969: 13) listed *Celtis spinosa*, other species of *Celtis* (Ulmaceae) and *Ruellia longifolia* (Acanthaceae) as foodplants.

DISTRIBUTION. Argentina, Bolivia and Brazil.

MATERIAL EXAMINED

Halysidota steinbachi Rothschild, lectotype ♂, Argentina: Tucumán (*J. Steinbach*) (BMNH).

Argentina: 1 ♂, 1 ♀, Tucumán (*Steinbach*) (BMNH) (paralectotypes); 2 ♀, Salta (*Steinbach*) (1 ex. iv.–xi.1903) (BMNH) (paralectotypes); 1 ♂, 4 ♀, Ciudad de Tucumán, 450 m, i.1901, iii.1903 (*Monetti, Dinelli*) (BMNH) (paralectotypes); 9 ♂, 5 ♀, Tucumán (BMNH, ZSBS); 2 ♀, Ciudad de Tucumán, iii, xi, xii.1901, 1903 (BMNH); 7 ♂, 'Tucuman City, Horco Molle', 10.xi.1967 (CM); 52 ♂, 19 ♀, Tucumán Prov., Parque Sierra San Javier, Horco Molle, 700 m, ix.1960, 9.iii.22–24.xi.1973 (AMNH (1 ♂), LACM); 1 ♂, Salta (BMNH); 22 ♂, 5 ♀, La Rioja, i.ii.1918 (BMNH); 1 ♂, 2 ♀, Olivos, La Lucilla, 17–26.iii.1952, 12.xi.1953 (ZSBS); 1 ♀, Buenos Aires Prov., Tandil, 250 m, iii.1956 (ZSBS). Bolivia: 4 ♂, 1 ♀, La Paz, 1500–2000 m (ZSBS); 1 ♀, Cochabamba, El Limbo, 2000 m, 16.xii.1961 (ZSBS). Brazil: 1 ♀ (BMNH).

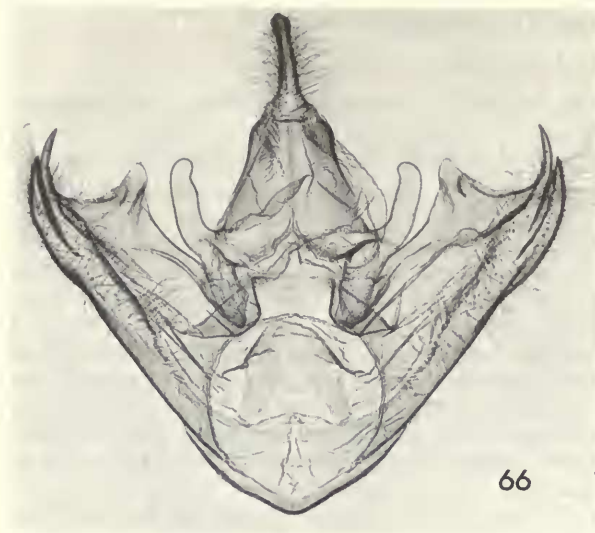
Halysidota fuliginosa Rothschild sp. rev.

(Figs 19, 20, 68, 69)

Halysidota fuliginosa Rothschild, 1909: 282. LECTOTYPE ♂, MEXICO (BMNH), here designated [examined].

Halysidota fuliginosa Rothschild; [Rothschild], 1911: pl. 11, fig. 1 (lectotype) [fig. 2 is of *H. atra* Druce].

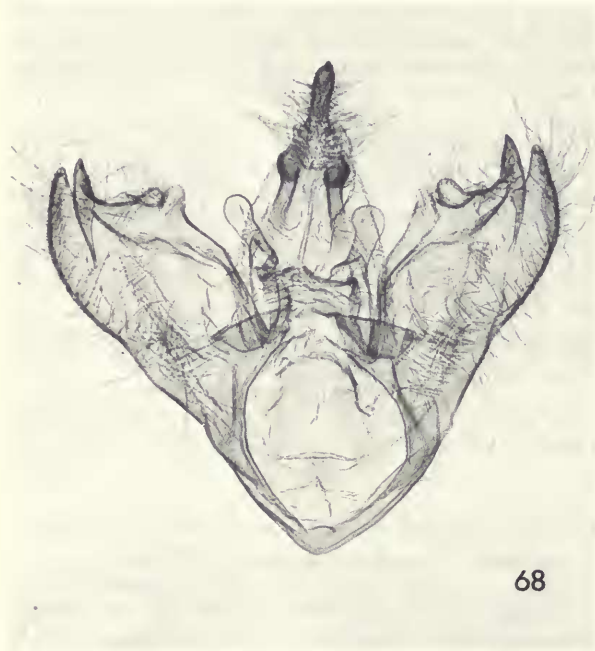
Halysidota carinator Dyar, 1912: 51. Lectotype ♂, MEXICO (USNM), designated by Watson, 1971: 20 [examined]. Syn. n.



66



67



68



69

Figs 66–69 *Halysidota* ♂ genitalia. (66, 67) *steinbachi* lectotype, slide 2151. (68, 69) *fuliginosa*, slide 2260, Mexico.

Halysidota cinctipes ab. *meta* Strand, 1919: 74. Holotype ♀, GUATEMALA (BMNH) [examined]. [Infrasubspecific name.]

Halysidota cinctipes ab. *carinator* Dyar; Seitz, 1922: 412 [but misspelt as 'caripator'].

DESCRIPTION. ♂ and ♀. Yellow form. Forewing: ♂, 25–26 mm; ♀, 27–29 mm. Clypeofrons black except for orange-yellow area above labrum. Vertex pale orange-brown, with faint greenish blue band between antennae. Basal segment of palp brownish orange anteriorly, black posteriorly; second segment black irrorate with greyish white and with brownish orange patch at middle; third segment as second, but with orange patch. Dorsal surface of antenna brownish orange basally; remainder dark brown. Longest antennal pectination three times diameter of shaft at that point. Patagia and tegulae brownish orange; both

bordered posteriorly and medially with bluish green; each tegula with black longitudinal streak in middle. Rest of thorax brownish orange, with bluish green mid-dorsal line and dark brown band extending from eye to base of forewing. Microtymbal number: 11 to 12. Outer surfaces of legs very pale brownish orange, rear surface brownish orange; markings black or, more commonly, a mixture of black and white scales edged with black. Forewing very pale brownish orange above; fasciae orange-brown, except for brownish orange costal and discocellular markings; under surface paler. Hind wing pale brownish orange, with trace of brown apical marking in few specimens examined. Abdomen brownish orange dorsally, much paler ventrally; black lateral spots present on segments 3 to 8 (♂) or 3 to 6 (♀).

Brown form. This differs from the pale form in the darker, more brownish coloration of the head, thorax, legs and forewings, in the greyish brown hind wings and in the coloration of the abdomen, which is dark brown dorsally except for segment 1 and tail tuft which are brownish orange. This form is represented in the material studied only by the type of *fuliginosa*, a male from Cuernavaca, Mexico (USNM), and another from Zacualpan, Mexico (AMNH). A male from Jalapa, Mexico, and two from Orizaba, Mexico (USNM, AMNH), are intermediate in coloration between the brown and yellow forms.

♂ genitalia. Apical processes of valve about equal in length; apical costal process usually with small rounded pre-apical emargination on medial side [not present in Fig. 68]; non-setose mid-costal process angulate laterally when viewed ventrally. Vincular lobes often weakly clavate; about three times as long as least width. Lobes of tegumen variable in size and may be less well developed than in Fig. 68; spines just visible at $\times 32$. Large anterior lobe of vesica bearing three smaller lobes on left-hand side, the largest of these minutely scobinate.

DIAGNOSIS. In both colour-forms the confluence of the subterminal with the terminal fascia at the middle of the outer margin is generally diagnostic. The combination of this character, the uniform tone of the markings and the overall brownish orange coloration provide a set of characters sufficient to distinguish most specimens of the pale form from the rest of the *tessellaris*-group. Males can be identified with certainty by examination of the genitalia.

STATUS. Dyar's (1912: 51) description of *carinator* included a comment that the name might prove to be a junior synonym of the already described *fuliginosa*. Dyar's supposition has been confirmed, so that the species *fuliginosa* has as its type-specimen an example of the apparently rare brown form. Travassos (1963: 476, 477) wrongly synonymized *fuliginosa*, *carinator* and *meta* (which then arguably attained subspecific rank) with *tessellaris*.

LECTOTYPE. The specimen chosen as lectotype of *fuliginosa* was the only one of the four syntypes to bear a large, red, handwritten label in Rothschild's handwriting 'Halisidota fuliginosa Rothschild. Type'. The remaining 3 syntypes are females of a new subspecies of *atra*.

DISTRIBUTION. Most of the material examined was caught in Mexico and Central America, but single specimens from Cuba, Florida and California have been examined. The handwritten label attached to the Californian specimen appears to read 'Ben Lomond, Calif.'. Ben Lomond is a town some five miles from the coast midway between Monterey and San Francisco, and the occurrence there of *fuliginosa* may have resulted from a chance introduction from shipping originating in Mexico.

Two male specimens from Venezuela in the BMNH are tentatively associated here with *fuliginosa*. Both have a narrower terminal fascia on the forewing and have darker postmedial, discocellular, medial, antemedial and basal markings. The specimen labelled simply 'Venezuela' has a spinose vestiture on the smaller of the two lobes on the left-hand side of the anterior vesical lobe; the specimen from Mérida has this small lobe scobinate to the same degree as the larger lobe.

MATERIAL EXAMINED

Halisidota fuliginosa Rothschild, lectotype ♂, **Mexico**: Cuernavaca (BMNH). *Halisidota carinator* Dyar, lectotype ♂, **Mexico**: Jalapa (USNM).

U.S.A.: 1 ♂, California, Ben Lomond (USNM); 1 ♀, Florida (*E. L. Graef*) (USNM). **Cuba:** 1 ♂ (BMNH). **Mexico:** 1 ♀, Sinaloa, 44 miles [70.8 km] E. of Villa Union, 27.viii.1960 (LACM); 10 ♂, 5 ♀, [Vera Cruz state,] Orizaba (AMNH iv.1913–viii.1920, BMNH, MNHN, USNM); 4 ♂, 7 ♀, [Vera Cruz,] Jalapa, 23.iv.–ix.1913, 1922, 1931 (AM, AMNH, BMNH, MNHN, ZSBS); 1 ♂, [Vera Cruz,] Cordoba region (BMNH); 1 ♂, 4 ♀, [Vera Cruz,] Coatepec (BMNH, USNM); 1 ♀, Vera Cruz, 1 mile [1.6 km] S. of Pueblo Calchualco, 6200 ft [1880 m], 20.vii.1973 (LACM); 2 ♂, 1 ♀, Puebla [state], near Zacapoaxtla, 1.ix.1971,

Finca San Juan Apulco, 1.ix.1971 (LACM); 1 ♀, Morelos, ix. (LACM); 1 ♂, [Morelos state,] Cuernavaca (USNM); 1 ♂, 2 ♀, [Morelos,] Zacualpan, vii, ix.1913 (AMNH); 1 ♂, [Jalisco state,] Vulkan Colima, 9.v.1973 (ZSBS); 2 ♂, Chiapas (LACM); 3 ♂, 1 ♀, Union Juarez, 7.vi.–2.xi.1972 (LACM); 5 ♂, Chiapas, San Cristobal de las Casas, 2150 m, 1–5.viii.1966, 7–8.ii.1969, 27.i.1973 (AM, USNM); 2 ♂, 1 ♀ 'Mexico' (AMNH, BMNH). **Guatemala**: 2 ♂, Huehuetenango, Municipio Santa Cruz, Barillas, Chiblac, 15.viii, 12.ix.1974 (BMNH); 4 ♂, 11 ♀, Chajsel, Municipio Coban, Alta Verapaz, 1400 m, 29.xii.1972 (LACM); 1 ♀, Solota, 5 km NE. of Panajachel, 1700 m, 14–15.viii.1974 (LACM); 58 ♂, 37 ♀, Santa Maria de Jesús, Quetzaltenango, 1550 m, 30.ix, i.x (LACM); 1 ♀, Guatemala City (BMNH); 2 ♂, 'Guatemala' (MNHN). **Honduras**: 1 ♂, SE. Flores, Rancho Chiquito, 2–3.viii.1967 (USNM). **El Salvador**: 1 ♂, Cerro Verde, 6.viii.1967 (USNM). **Costa Rica**: 9 ♂, 1 ♀, Puntarenas province, N., Cordillera de Tilaran, Monteverde, 1400 m, 12.iii.1960, 26.ii.1962, 12–15.vi.1974 (AMNH, BMNH, LACM); 2 ♂, 1 ♀, San José province, 14 miles [22.5 km] N. of San Isidro del General, 1600 m, 20–23.vi.1974 (BMNH, LACM); 1 ♂, 3 ♀, San José, 15.v, 10.vi (BM); 2 ♂, [Cartago province], Juan Viñas (BMNH, USNM); 1 ♂, 4 ♀, [Cartago province,] Vulkan Irazu, Orosi, 1200 m (BMNH); 2 ♂, 'Candalaria Mts' (BMNH); 5 ♂, 2 ♀, 'Costa Rica' (BMNH, MNHN).

Halsidota orientalis Rothschild nom. rev., stat. n.

(Figs 21, 70, 71)

Halsidota underwoodi orientalis Rothschild, 1909: 284. LECTOTYPE ♂, TRINIDAD (BMNH), here designated [examined].

Halsidota underwoodi orientalis Rothschild; [Rothschild], 1911: pl. 11, figs 30, 31 (fig. 30 of type).

Halsidota underwoodi modalis Dyar, 1912: 53. Lectotype ♂, VENEZUELA (USNM) [designated by Watson, 1971: 61] [examined]. **Syn. n.**

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–28 mm; ♀, 26–31 mm. Clypeofrons dark brown or black dorsally, paler brown ventrally; vertex pale brownish white. Basal two-thirds of first segment of palp clothed in mixture of black and greyish white scales, remainder orange-yellow; segment 2 black and greyish white with preapical orange-yellow lateral patch; segment 3 black and greyish white. Scape and basal four or five segments of antenna orange-yellow; basal segments orange-yellow, remainder dark brown above. Longest antennal pectination equal to about 2.5 times diameter of antennal shaft at that point. Patagia pale brownish white, edged posteriorly with blue-green. Tegulae pale brownish white fringed medially with blue-green; most specimens without markings, but short faint longitudinal brown streak in middle in few examples. Rest of dorsal surface of thorax orange-yellow with blue-green dorsal line. Lateral surface of thorax orange-yellow with dark brown area from posterior border of eye to base of hind wing; ventral surface mostly pale yellow but orange-yellow anteriorly. Microtymbal number: 11 to 12. Outer surface of legs orange-yellow, rest pale yellow; markings a mixture of black and greyish white, edged with black. Forewing pale brownish yellow above; markings pale greyish yellow-brown, but discocellular and costal elements dull yellow edged heavily with black; terminal fascia usually narrower than subterminal fascia. Under surface of forewing paler; markings poorly defined and not yellow costally. Hind wing very pale yellow, with trace of brown apical marking at apex. Abdomen orange-yellow dorsally, pale yellow ventrally, black lateral spot present on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Spatulate apical process of sacculus extending distal to apical process of costa, the latter with shallow pre-apical emargination in most specimens. Non-setose costal process of valve slightly longer than setose costal process, strongly folded and directed at right-angles to costa. Vincular lobes clavate or not clavate, three to four times as long as least width. Lobes of tegumen with oblique rounded ridge posteriorly; rugose, not spinose. Scobinate anterior lobe of vesica with scobinate accessory lobe posterolaterally on right-hand side, and elongate transverse lobe at its base; this elongate lobe strongly spinose at dilated ventral end. Posterior lobe of vesica scobinate posteriorly and along left-hand side.

DIAGNOSIS. *H. orientalis* differs from the similarly patterned sympatric *underwoodi* by the absence in most specimens of a dark longitudinal streak on the tegulae, the paler less yellowish coloration and by the generally narrower medial fascia on the forewing. The male genitalia readily separate these two species; the differently shaped valve apices can be seen without dissection in most specimens. Also similar externally to *pearsoni* but separable by the male genitalia.

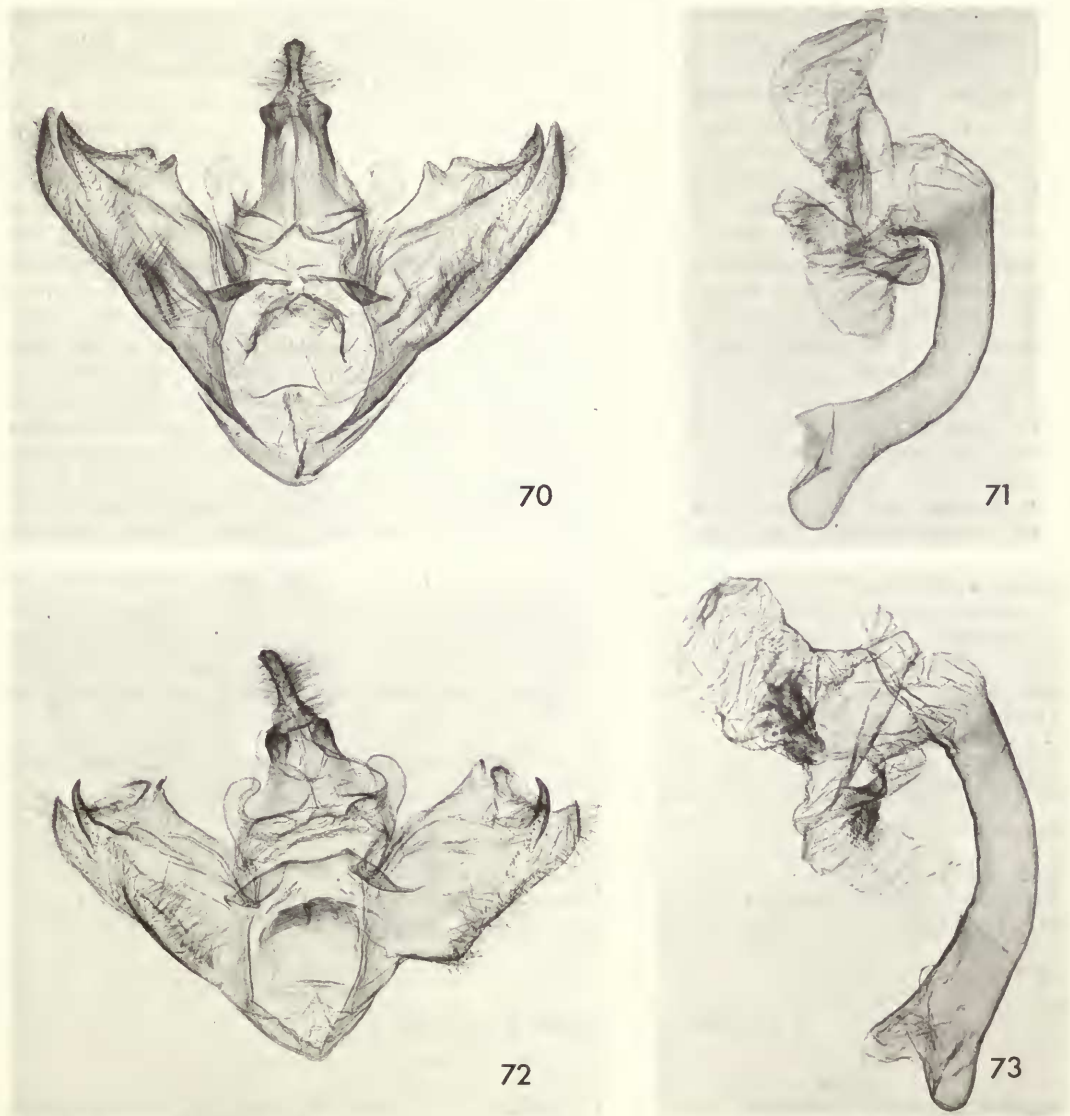
STATUS. Seitz (1922: 413) listed *orientalis* and *modalis* as subspecies of *underwoodi*, following their original placement there by Rothschild and Dyar respectively. Both names were placed

wrongly in the synonymy of *tessellaris* by Travassos (1963: 476, 477). Comparison of the types and of other specimens from Trinidad and neighbouring Venezuela has shown no differences between them, and that *modalis* should be considered a junior synonym of *orientalis*.

DISTRIBUTION. This species has been captured in Mexico and the Antilles southwards to Brazil. Large gaps in the known distribution presumably represent areas, at least in part, where collecting has either failed to produce *orientalis* or has not taken place. Two specimens in the BMNH from Corcovado, Chile, collected at 7,000 ft [2130 m] lack the oblique ridge on the lobes of the vinculum and may represent a new subspecies, but more material is needed to confirm this suggestion.

MATERIAL EXAMINED

Halisidota underwoodi orientalis Rothschild, lectotype ♂, **Trinidad**: Port of Spain (*F. Birch*) (BMNH).
Halisidota underwoodi modalis Dyar, lectotype ♂, **Venezuela**: Aroa (USNM).



Figs 70–73 *Halisidota* ♂ genitalia. (70, 71) *orientalis*, slide 2233, French Guiana. (72) *conflua* paratype, slide 2225, Peru. (73) *conflua* holotype, slide 2345, Peru.

Mexico: 2 ♀, Nuevo Leon, 2 miles [3.2 km] S. of Monterey, Chipinque Mesa, 10.viii.1963 (USNM); 1 ♂, [Vera Cruz state,] Misantla, viii.1912 (BMNH); 6 ♂, 4 ♀, Chiapas state, Union Juarez, 28.x.–7.xi.1972 (LACM). **Guatemala:** 1 ♀, Cayuga (BMNH); 1 ♂, Las Mercedes (BMNH). **Costa Rica:** 1 ♂, 1 ♀, Puntarenas province, Osa Peninsula, 1.8 miles [2.9 km] W. of Rincon, 22, 25.ii.1971 (LACM). **Panama:** 2 ♂, 2 ♀, Panama Canal Zone, near Colon, Francefield, 27, 30.x.1924 (BMNH). **Colombia:** 1 ♀, Popayan (USNM); 1 ♂, Cundinamarca, Monterredondo, 1420 m, 25.xii.1961 (ZSBS); 1 ♀, Medina, 500 m (BMNH). **Windward Islands:** 1 ♂, 1 ♀, Grenada, Grand Etang, 23.x.–1.xi.1975 (USNM). **Trinidad:** 17 ♂, 14 ♀, Curepe, iv.–xii.1968, 1969 (BMNH); 2 ♀, Belmont, Port of Spain (BMNH); 1 ♂, 2 ♀, Port of Spain (BMNH) (paralectotypes of *H. orientalis*); 2 ♂, 2 ♀, Caparo, xii.1905 (BMNH) (paralectotypes of *H. orientalis*); 1 ♂, Balandra, 3.x.1969 (BMNH); 1 ♂, St Anns (BMNH); 1 ♂, Narieva district, Tabaguite (BMNH) (paralectotype of *H. orientalis*); 2 ♂, 1 ♀, Arima Valley, 29.iv, 22.v.1951 (AMNH); 2 ♂, 5 ♀, no further data (BMNH). **Venezuela:** 1 ♂, San Esteban Valley, Las Quigas (USNM); 1 ♀, Caracas (BMNH); 1 ♂, Maracay (BMNH); 1 ♂, 1 ♀, Aragua, El Limon, 450 m, 25.viii.1962 (UCV); 2 ♀, Las Cruces, Colon, 250–750 ft [76–229 m] (BMNH). **Peru:** 1 ♀, La Merced, 2,500 ft [762 m] vii, viii.1903 (BMNH). **Guyana:** 2 ♂, 1 ♀ (BMNH) (paralectotypes of *H. orientalis*). **French Guiana:** 1 ♂, 1 ♀, St Jean de Maroni (BMNH). **Ecuador:** 1 ♂, Gorotiré (Toulgoët Coll.). **Bolivia:** 1 ♀, Prov. del Sora, Dep. Sta Cruz, 450 m, i. (BMNH). **Brazil:** 1 ♂, 1 ♀, Pará (BMNH); 1 ♂ [Pará] Obidos (CM); 2 ♂, Pernambuco state, Serra de Communaty, 1893 (BMNH); 2 ♂, Rio State, Terezopolis, Barreira, 350 m, 3–4.i., 22–24.ii.1957 (BMNH).

Halysidota conflua sp. n.

(Figs 22, 23, 72, 73)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26 mm; ♀, 28 mm. Clypeofrons dark brown, becoming paler towards labrum; vertex yellowish white. Basal and second segments of palp orange-yellow proximally, dark brown distally; third segment dark brown. Antennal scape pale orange-yellow; shaft yellowish white above proximally, remainder brown. Longest antennal pectination about twice diameter of shaft at that point. Patagia yellowish white with greenish blue posterior fringe. Tegula yellowish white with longitudinal black streak in middle; hair-scales of medial fringe orange-yellow proximally, greenish blue distally. Rest of thorax orange-yellow dorsally and laterally, with greenish blue mid-dorsal line; pale orange-yellow ventrally. Microtymbal number: 14. Legs orange-yellow (palest on inner surface); markings brown. Ground-colour of upper surface of forewing yellowish white; partly confluent yellow-brown fasciae becoming orange-yellow at costa and at end of cell; under surface of wing and fasciae pale yellowish brown at costa and at end of cell. Hind wing yellowish white, with brown marginal markings in apical region and along outer margin. Abdomen orange-yellow dorsally, paler ventrally, with dark brown lateral spot on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical costal process of valve extending just distal to apical process of sacculus; costa straight between apex of valve and non-setose costal process. Vincular process between 2.5 and 3.0 times smallest diameter; strongly arcuate. Lobes of tegumen moderately well developed; spines just visible at ×8 magnification. Vesica similar in shape to that of *ruscheweyhi* and others; longest spine of anterior lobe about 2.5 times its diameter at base.

DIAGNOSIS. Distinguished externally from all other species of its group by the very broad, partly confluent medial and subterminal fasciae of the forewing.

DISTRIBUTION. Known only from Peru.

MATERIAL EXAMINED

Holotype ♂, **Peru:** Lobitos, 18.iv.1925 (*H. F. Slattery*) (BMNH).

Paratypes. **Peru:** 1 ♂, 1 ♀, Lobitos, iv.1925 (*H. F. Slattery*) (BMNH).

Halysidota underwoodi Rothschild sp. rev.

(Figs 27–33, 74, 75, 77)

Halysidota underwoodi Rothschild, 1909: 284. LECTOTYPE ♀, COSTA RICA (BMNH), here designated [examined].

Halysidota underwoodi Rothschild; [Rothschild], 1911: pl. 11, figs 3 and 4 [fig. 4 probably represents the lectotype].

Halisidota bricenoi Rothschild, 1909: 282. Lectotype ♂, VENEZUELA (BMNH), designated by Hampson, 1920: 283 [examined]. **Syn. n.**

Halisidota bricenoi Rothschild; [Rothschild], 1911: pl. 11, figs 28 and 29.

Halisidota schausi meridensis Rothschild, 1909: 285. LECTOTYPE ♂, VENEZUELA (BMNH), here designated [examined]. **Syn. n.**

Halisidota cinctipes meridensis Rothschild; [Rothschild], 1911: pl. 11, figs 23 and 24 [fig. 23 probably represents the lectotype].

Halisidota cinctipes ab. *lucia* Strand, 1919: 74. Holotype ♀, VENEZUELA (BMNH) [examined]. [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 25–28 mm; ♀, 28–32 mm. Pale form, including lectotype of *underwoodi* and *meridensis*. Clypeofrons black; vertex yellowish brown, the scales tinged with bluish green distally between bases of antenna and posteriorly. Palp as for *orientalis*. Antenna (♂) orange-yellow above proximally, becoming dark brown at middle and unscaled distally; longest antennal pectination equal to about 2.5 times diameter of shaft at that point; six apical segments approximately triangular in shape in ventral view, non-serrate. Patagia yellowish brown edged posteriorly with bluish green. Tegulae yellowish brown fringed medially and posteriorly with bluish green and with black longitudinal streak at middle. Rest of dorsal surface of thorax orange-yellow, with bluish green mid-dorsal line. Lateral and ventral surfaces of thorax orange-yellow, but black around eyes and in band extending from eye to base of hind wing. Microtymbal number: 12 to 13. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of black and white scales edged with black. Forewing pale brownish yellow; markings yellowish brown; discocellular marking and costal elements of fasciae darker in tone, orange-yellow; subterminal fascia sometimes interrupted in middle of wing and often connected to terminal fascia at M_2 ; medial fascia often broad (three times as long as broad); under surface paler, without orange-yellow costally or in discocellular marking. Hind wing pale orange-yellow, with small brown apical marking. Abdomen orange-



74



75

Figs 74, 75 *Halisidota underwoodi* ♂ genitalia, slide 2234, Mexico.

yellow dorsally, pale yellow ventrally; black lateral spot present on segments 3 to 8 (♂) or 3 to 6 (♀); some specimens with black mid-ventral marking on segment 3 (and rarely segment 4) in male, and on segments 3 to 6 in female.

Dark form, including lectotype of *bricenoi*. This is well illustrated in colour by Rothschild (1911: pl. 11, figs 28, 29) and Seitz (1922: pl. 59—*bricenoi*). It differs from the pale form in the dark yellowish brown coloration of the dorsal surfaces of the head, thorax, wings and abdomen and of the under surface of the wings. The ventral surface of the thorax and abdomen is buff and there is some deep brownish yellow coloration on the palps, antennae and the outer surface of the legs.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Non-setose mid-costal process of valve longer than or equal in length to setose process. Vincular lobes short, about as long as broad. Lobes of tegumen moderately well developed; spines readily visible at $\times 32$ magnification. Anterior lobe of vesica spinose at its base on left-hand side and with small accessory lobe (the latter minutely spinose anteriorly; posterior lobe of vesica scobinate).

VARIATION. Specimens intermediate in coloration between the pale and dark forms occur in both Central and South America. The forewings of these specimens are yellowish brown, and the hind wings a darker brown except for a yellowish orange anal area. The abdomens of these specimens are orange-yellow above, not brown as in the dark form of the species.

Variation in the form of the subterminal fascia is illustrated in Figs 27–33. The anal part of this fascia is usually better developed than in *pectenella*. In some South American specimens (e.g. the lectotype of *meridensis*, Fig. 29) there is a reduction in the degree of black scaling around the discocellular marking and the costal elements of the basal, antemedial and medial fasciae.

DIAGNOSIS. Probably most likely to be confused with *orientalis*, but differs in the presence of a black streak on the tegulae, a generally broader medial fascia, and, in the pale form of the species, a more yellowish coloration. The male genitalia also separate these two species. Distinguished from *pearsoni* by the presence of dark scales on the veins crossing the subterminal and terminal fasciae on the upper surface of the forewing and by the shape of the valves and vesica in the male genitalia.

STATUS. The names *underwoodi*, *bricenoi* and *meridensis* were placed wrongly in the synonymy of *tessellaris* by Travassos (1963: 476). An examination of the types representing these three names has shown them to be conspecific and as first reviser (Article 24a of the Code) I select *Halysidota underwoodi* Rothschild as the name of this species. (Applying page priority would have resulted in accepting *bricenoi* as the valid name, and the type of *bricenoi* is an example of the less common dark form of the species.)

LARVA. Described by Avril Fox (pers. comm.) as dark brown, with pale yellow anterior and posterior hair-tufts; the anterior hair-tufts partly posteriorly directed and partly anteriorly directed. The food-plant was identified by the Agronomy Faculty of the Universidad Central de Venezuela at Maracay as a species of *Acalypha*, possibly *A. macrostachya* (Euphorbiaceae).

DISTRIBUTION. U.S.A., Mexico, Guatemala, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru and Bolivia.

MATERIAL EXAMINED

Halysidota underwoodi Rothschild, lectotype ♀, **Costa Rica** (BMNH). *Halysidota bricenoi* Rothschild, lectotype ♂, **Venezuela**: Mérida (*Briceno*) (BMNH). *Halysidota schausi meridensis* Rothschild, lectotype ♂, **Venezuela**: Mérida (*Briceno*) (BMNH).

Pale form. **U.S.A.**: 1 ♂, Texas, Harris County (CM); 1 ♀, California, Ben Lomond. **Mexico**: 1 ♀, 'Mexico' (BMNH); 1 ♂, San Luis Potaro, Tamazunchale, 300 ft [90 m], 2.xi.1975, 26.iii.1977 (AMNH); 1 ♀, Vera Cruz (paralectotype of *H. underwoodi* Rothschild); 6 ♂, 4 ♀ [Vera Cruz state,] Orizaba, i, iii.1896 (AMNH, BMNH, USNM) (including 1 ♂ and 1 ♀ paralectotype); 1 ♂, Vera Cruz, San Andres Tuxtla, ix.1939 (AMNH); 4 ♀, [Vera Cruz state,] Misantla, viii.1912, xii.1914 (BMNH, ZSBS); 1 ♂, 8 ♀, [Vera Cruz state,] Jalapa (AMNH, BMNH, ZSBS); 1 ♂, Hidalgo, Chapulhuacan, 19.ix.1971 (LACM); 1 ♀, Puebla, near Zacapoaxtla, Finca San Juan Apulco, 2.ix.1971 (LACM); 1 ♂, Oaxaca, 24 miles [38 km] S. of Valle Nacional, 6600 ft [2000 m], 24–25.vii.1970 (LACM); 1 ♂, Chiapas, Tapachula, Finca Violetta, 22.x.1954 (ZSBS); 3 ♂, 7 ♀, Chiapas, Union Juarez, 24–31.x, 1–3.xi.1972 (LACM); 1 ♂, 1 ♀ Chiapas, Rancho Santa Rosa, 91°20'W, 16°10'N, 12.iv.1975 (LACM). **Guatemala**: 21 ♂, 2 ♀, Quetzaltenango, Santa Maria de

Jesús, 1550 m, 30.ix, 1.x.1976 (BMNH, LACM); 1 ♀, Zacapa, La Unión, 850 m, 30.viii, 26.xi.1972 (LACM); 11 ♂, 11 ♀, Chiblac, Barillas, Municipio Santa Cruz, 1000 m, 9.viii.–19.x.1974 (BMNH). **Nicaragua**: 3 ♂, 1 ♀, Jinotigua road, Km 148, 1400 m, 30.iii.1970 (Toulgoët Coll.). **Costa Rica**: 9 ♂, 11 ♀, Puntarenas Province, Monteverde, 1400 m, 26.ii–1.x.1960, 12–15.vi.1974 (AMNH, BMNH, LACM); 14 ♂, 31 ♀, San José province, 14 km N. of San Isidro del General on Pan-American Highway, 1600 m, 18–25.vi.1971, 20–23.vi.1974 (BMNH, LACM); 1 ♂, 3 ♀, San José Province, Cerro de la Muerte, Villa Mills, 3100 m, 21.vi.1971, 18–19.vi.1974 (LACM); 1 ♂, 2 ♀, San José (BMNH); 1 ♂, 1 ♀ [Cartago province,] Juan Viñas (BMNH, USNM); 2 ♂, 5 ♀ [Cartago province,] Volcan Irazu, 1200 m (BMNH); 2 ♀, [Cartago province,] Ojo de Agua, Route 2, Km 75, 30.vi.1967 (USNM); 1 ♀, near Cartago, 1500 m, 1910 (MNHN); 1 ♂, Tuis (BMNH) (paralectotype of *H. underwoodi* Rothschild); 1 ♂, 1 ♀, Candalaria Mts (BMNH); 1 ♀, Puntarenas province, Osa Peninsula, 1.8 miles [2.9 km] W. of Rincón, 22.ii.1971 (LACM). **Panama**: 1 ♀, Lino, 800 m (BMNH). **Colombia**: 1 ♂, 1 ♀, San Antonio, 2000 m, xii.1907 (BMNH); 1 ♂, Barbosa, 16.v.1961 (ZSBS); 2 ♂, 2 ♀, 1 ♀, Santander del Norte, Bella Vista, 2300 ft [700 m] (AMNH); 1 ♂, Minca, Sta Marta, 13.vii.1913 (CM); 1 ♀, Cundinamarca, Monterredondo, 1420 m, 28.ix.1961 (ZSBS); 2 ♂, 'Colombia' (AMNH). **Venezuela**: 10 ♂, 14 ♀, Aragua, Rancho Grande, 1150 m, 12–15.vii.–14.viii.1946, 7.iii.–4.x.1962–1976 (AM, AMNH, BMNH, LACM, Toulgoët Coll., UCV); 1 ♂, 4 ♀, Caracas (BMNH); 1 ♂, Maracay (ZSBS); 5 ♂, 14 ♀, Mérida (BMNH, MNHN, USNM); 2 ♂, Barinas, La Chimenea, 5 km Sur La Soledad, 1500 m, 2–3.vii.1975 (UCV); 1 ♂, 3 ♀, 'Venezuela' (BMNH, including type of ab. *lucia* Strand, USNM). **Ecuador**: 1 ♀, Pichincha, 'Rte S° Domingo I.C. Quito km. 16', 65 m, 19–22.i.1975 (Toulgoët Coll.); 1 ♂, 1 ♀, Pichincha, 'Palma/Texaco', 1650 m, 27.iv.1976 (Toulgoët Coll.); 1 ♂, 1 ♀, Pichincha, 'Qui/Chiriboga/k 33', 2650 m, 25.iv.1976 (Toulgoët Coll.); 1 ♀, Tinalandia, near Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS); 1 ♀, Bolivar province, Balzanamba, ix.1893–11.1894 (BMNH). **Bolivia**: 1 ♂, Coroico (BMNH).

Dark form. **Venezuela**: 15 ♂, 25 ♀, Mérida, 1500 m and 1630 m, v.1899, 18.iv.1975 (BMNH, UCV, USNM). **Colombia**: 1 ♀, Popayan (USNM). **Peru**: 1 ♀, Chanchamayo, La Merced (USNM).



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Figs 76, 77 *Halysidota*, apical segments of ♂ antenna. (76) *pectenella*, (77) *underwoodi*.

Halysidota pectenella sp. n.

(Figs 34, 76)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 22–25 mm; ♀, 27–29 mm. As for those small heavily marked specimens of *underwoodi* having an incomplete subterminal fascia on the forewing and lacking brown scales on the hind wing, but separable from most specimens of *underwoodi* by the narrower terminal fascia, the more heavily marked discocellular markings and costal elements of the medial, antemedial and basal fasciae, by the paler ground-colour of the upper surface of the wings, and in the male by the shape of the apical segments of the antenna (see Figs 34, 76). The male genitalia are identical to those of *underwoodi*.

REMARKS. Heavily marked specimens of *pectenella* resemble *interlineata* in general appearance (but not in the male genitalia). *H. pectenella*, however, invariably retains subterminal markings

in the middle of the forewing, whereas *interlineata* has the subterminal markings restricted to the anal and/or costal margins of the wing.

VARIATION. A single dark brown, nearly black specimen has been examined during the present study; this is from Barinas state, Venezuela, and is in the collection of the UCV, Maracay. Noticeable variation in the colour-pattern is restricted otherwise to the subterminal fascia on the forewing which is commonly represented by small markings at the costa, between veins R_5 and M_3 , and between CuA_2 and the anal margin, but lacks the costal marking in a few male specimens examined, and is nearly complete in one female.

DISTRIBUTION. Mexico, Guatemala, El Salvador, Costa Rica, Panama, Colombia, Venezuela, French Guiana, Ecuador, Peru, Bolivia, and possibly Brazil (see next section).

MATERIAL EXAMINED

Holotype ♂, **Guatemala**: Depto Zacapa, La Unión, 850 m, 21.x.1972 (*Welling*) (LACM).

Paratypes. **Mexico**: 1 ♂, Chiapas, 'Hamburgo', xii.1933 (AMNH); 1 ♂, Chiapas, Tapachula, Finca Violeta, 23.ix.1974 (ZSBS); 1 ♂, Chiapas, Rancho Santa Rosa, 91°20'W, 16°10'N, 5000 ft [1520 m], 12.iv.1975 (LACM). **Guatemala**: 1 ♀, Depto Alto V.P., Coban, 22–23.vii.1966 (USNM); 1 ♀, Guatemala City (BMNH); 3 ♂, Chiblac, Barillas, Municipio Santa Cruz, Huehuetenango, c. 1000 m, 13–15.viii.1974 (BMNH); 24 ♂, 1 ♀, type-locality, 8.x.–25.xii.1972, 1–8.i.1973 (LACM); 1 ♂, Cayuga (USNM). **El Salvador**: 1 ♀, L. Ilopango, 5.viii.1967 (USNM). **Costa Rica**: 1 ♂, 1 ♀, Cartago province, Turrialba, 14–17.v.1974, 1.ix.1974 (LACM, ZSBS); 2 ♂, [Cartago province,] Juan Viñas (CM, USNM); 2 ♂, 'Costa Rica' (BMNH). **Panama**: 3 ♂, Bocas, 13, 14.viii.1931 (BMNH). **Colombia**: 1 ♂, Nari River, Antioquia (USNM); 2 ♂, Cundinamarca, Monterredondo, 1420 m, 23.ix.1961 (ZSBS); 1 ♂, Rio Negro, 800 m (BMNH); 1 ♂, Depto Magdalena, Don Amo, 4000 ft [1220 m] (BMNH). **Venezuela**: 1 ♂, Barinas, San Isidro, 14 km Sur La Soledad, 1500 m, 1.vii.1975 (UCV) (the only known specimen of the dark brown form); 1 ♂, Barinas, La Chimenea, 5 km Sur La Soledad, 1500 m, 2–3.viii.1975 (UCV); 2 ♂, 2 ♀, Aragua, Rancho Grande, 1150 m, 12.iv.1972, 28.vi–18.vii.1974 (BMNH, LACM); 4 ♂, 1 ♀, San Esteban (BMNH); 3 ♂, Las Quiguas, near San Esteban (BMNH); 1 ♂, Miranda, Parque Nacional Guatopo, 24 km N. Altigracia de Orituco, 640 m, 30.i.1976 (BMNH). **French Guiana**: 1 ♀, Kourou, 150 m, 3, 4, ii.1971 (Toulgoët Coll.); 1 ♀, Cayenne (USNM). **Ecuador**: 1 ♂, 1 ♀, Tinlandia, near Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS); 3 ♂, Tinlandia, Pichincha, 'Rte So Domingo, I.C. Quito km 16', 650 m, 19–22.i.1975, 18–19.iv.1977 (BMNH); 2 ♂, near Rio Pastaza, Route Puyo-Macas, Pastaza, 1050 m, 23.ii.1979 (Toulgoët Coll.). **Peru**: 1 ♂, Chanchamayo (BMNH); 1 ♀, Junin, San Ramon, Est. Naranjal, 1000 m, 20–27.vii.1965 (AMNH); 1 ♂, Yahuar Mayo, 1200 ft [366 m], iv–v.1912 (BMNH); 1 ♂, Tingo Maria, 20.ii.1950 (USNM); 1 ♂, Carabaya, Rio Huacamayo, 3160 ft [960 m], dry season, vi.1904 (BMNH) (a paralectotype of *H. underwoodi* Rothschild). **Bolivia**: 1 ♂, 2 ♀, Rio Songo, 750 m (BMNH, USNM).

Non-paratypic material. **Brazil**: 1 ♀, Pará (BMNH).

Halysidota atra Druce

(Figs 35, 36, 78, 79)

Halysidota atra Druce, 1884: 92.

DESCRIPTION. ♂. Clypeofrons dark brown or black; vertex brown. Palp dark brown or black; basal segment orange-yellow distally; second segment with orange-yellow patch laterally; second and apical segments irrorate with greyish white scales. Scape of antenna brown or orange-yellow; pedicel orange-yellow; remainder brown; longest antennal pectination (♂) about twice diameter of shaft at that point. Patagia brown, edged posteriorly with blue-green. Tegulae brown with black longitudinal streak in middle; hair-scales of medial fringe yellowish brown proximally, blue-green distally. Rest of thorax brown, with greenish brown mid-dorsal line and becoming orange-yellow ventrally. Outer surfaces of trochanter and femur of legs yellowish brown, tarsi yellowish brown proximally becoming orange-yellow distally or orange-yellow in ground-colour from base to apex; inner surfaces orange-yellow. Markings of legs a mixture of greyish white and black scales, edged with black. Microtymbral number: 12 to 13. Upper surface of forewing dark brown except for yellowish brown costal area. Fasciae edged with black scales, greenish yellow in costal area and at distal end of cell, otherwise yellowish brown. Subterminal fascia represented by marking at costa, usually another between veins M_2 and M_3 and a third at anal margin, or solely by costal marking. Terminal fascia greatly reduced or absent. Under surface of forewing similar to upper surface but markings

less well defined. Hind wing brown. Abdomen orange-yellow, brown and orange-yellow, or dark brown dorsally and laterally; yellowish brown ventrally.

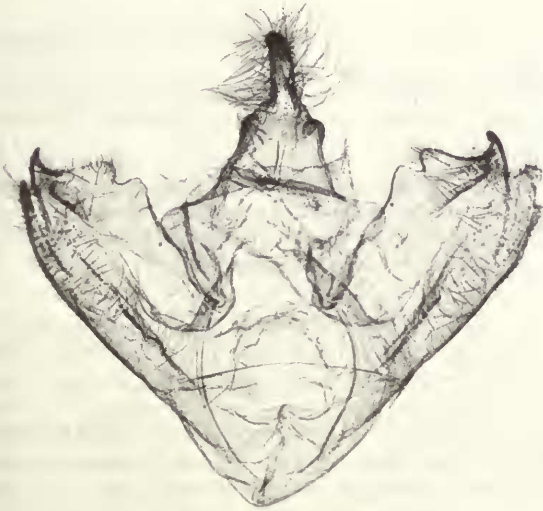
♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Mid-costal processes of valve small; non-setose process slightly more prominent than setose process. Vincular lobes short, as long as broad or slightly longer than broad. Lobes of tegumen moderately well developed; spines just visible at $\times 32$ magnification. Anterior lobe of vesica non-spinose distally; elongate lobe at base of anterior lobe spinose; tapered posterior lobe scobinate.

♀. Similar to male, but ground-colour of forewing pale yellowish brown; hind wing either entirely brown or, more commonly, pale yellowish brown becoming brown anally; all other brown areas much paler, more yellowish; and abdomen either brownish orange-yellow dorsally except for yellowish brown dorsomedial area or entirely dark brown dorsally.

DIAGNOSIS. Likely to be confused only with the dark form (known from a single male) of *pectenella*, but the antenna of *atra* is similar to that of *underwoodi* (Fig. 77) apically, and the shape of the valve and ornamentation of the vesica is diagnostic. The nominate subspecies of *atra* differs from the dark form of *pectenella* in its dark brown antennal scape.

VARIATION. This is the only species of its group in which there is no pale or yellow form of the male. Females vary to a limited extent (in the nominate subspecies) in the coloration of the abdomen, as well as between subspecies. All the females examined have at least partly brown hind wings.

DISTRIBUTION. Both subspecies have been recorded from Colombia. The nominate species is represented there by two specimens: a female labelled simply 'Colombia' and a male labelled 'Nari River, Antioquia'; the male probably originating from the Rio Nare ($6^{\circ}12'N$, $74^{\circ}35'W$) in



78



79

Figs 78, 79 *Halysidota atra* ♂ genitalia. (78) *atra atra*, slide 2348, Mexico. (79) *atra rindgei* paratype, CM slide, Bolivia.

the Magdalena Valley separating the Eastern Cordillera from the Western Cordillera. To the north, *atra atra* extends through Central America to Mexico. The subspecies *atra rindgei* is known in Colombia from a single female collected by Fassl labelled 'Ober Rio Negro, Ost Colomb. 800 m.'. There are several rivers named Negro in Colombia, but those at 6°08'N, 72°17'W and 6°08'N, 73°08'W on the eastern side of the Eastern Cordillera of the Andes are at the right altitude and the banks of one of these may be where Fassl obtained his specimen. If this is so, the Eastern Cordillera may prove to be a barrier between the two subspecies in this part of their range. The other possible locality for this Fassl specimen is the upper reaches of the Rio Guainia, a tributary of the Amazon river, which at lower elevations in Brazil becomes the Rio Negro, but the stated altitude of 800 m makes this unlikely.

LECTOTYPE. The specimen chosen as lectotype of *atra* is one of two males from a syntypic series of two males and one female and is the only specimen bearing a label 'Type Sp. figured'. I have not accepted Hampson's (1901: 159) apparent type-designation of the female syntype 'Guatemala (*Champion*), 2 ♂, 1 ♀ type, Godman-Salvin Coll.'. Statements such as this are made elsewhere by Hampson listing first male then female specimens, followed usually without punctuation but less commonly by a comma (Hampson, 1901: 385) '6 ♂, 2 ♀, type'. An examination of several syntypic series listed by Hampson (1901) has shown that a statement by Hampson such as '2 ♂, 1 ♀ type' should be interpreted as '2 ♂, 1 ♀: type' and that such a statement indicates that one of the specimens listed (usually a male) was labelled as the type in the collections examined by Hampson (as stated by Gahan, 1926: [iii]). This argument applies to *atra*, in which the male syntype illustrated by Druce (1884: pl. 9, fig. 26) is the specimen which stood next to a round type-label in the BMNH collection curated by Hampson.

Key to subspecies

Scape of antenna dark brown	<i>atra atra</i> (p. 44)
Scape of antenna orange-yellow	<i>atra rindgei</i> (p. 45)

Halysidota atra atra Druce

(Figs 35, 36, 78)

Halysidota atra Druce, 1884: 92, pl. 9, fig. 26. **LECTOTYPE** ♂, GUATEMALA (BMNH), here designated [examined].

Halysidota atra Druce; [Rothschild], 1911: pl. 11, figs 10, 11 [fig. 10 is a ♂, probably Mexican; fig. 11 a ♀ from Costa Rica in BMNH, not a melanic specimen of *H. tessellaris* Smith as suggested by Travassos (1963: 487)].

DESCRIPTION. ♂ and ♀. Forewing: ♂ 21–24 mm; ♀ 24–29 mm. Scape of antenna dark brown or black, pedicel orange-yellow, rest of antenna dark brown dorsally. Terminal fascia of forewing represented usually only by apical marking, but continued as narrow band to M_3 or CuA in a few specimens. Female abdomen brown dorsally, brown becoming orange-yellow posteriorly, or wholly orange-yellow.

MATERIAL EXAMINED

Halysidota atra Druce, lectotype ♂, **Guatemala**: Las Mercedes, 3000 ft [910 m] (*Champion*) (BMNH).

Mexico: 4 ♂, 6 ♀, San Luis Potosi, Tamazunchale, 300 ft [90 m], 18.iii.–13.xii, 1952–1975 (AMNH, BMNH, USNM); 1 ♀, San Luis Potosi, El Salto Falls (AMNH); 1 ♀, San Luis Potosi, Xilitia, 3500 ft [1070 m] (AMNH); 1 ♀, [Vera Cruz state,] Orizaba (BMNH); 3 ♀, [Vera Cruz,] Cordoba, 16.v.1908, 22.xii.1965 (USNM); 6 ♂, 7 ♀, [Vera Cruz,] Misantla, vi.–xi, 1909–1914 (AMNH, BMNH, USNM, ZSBS); 3 ♀, Vera Cruz, Catemaco, 12.vii.1973 (LACM); 2 ♀, Vera Cruz, Tapalapan (near Santiago Tuxtla), 2.vii.–11.ix, 1970–1973 (LACM); 1 ♂, Vera Cruz, Huatuxco (BMNH); 3 ♀, [Vera Cruz,] Jalapa, 1 ♂, 1 ♀, 'Vera Cruz' (AMNH, BMNH); 1 ♀, Chiapas, Rancho Santa Rosa, 5600 ft [1710 m], 91°20'W, 16°10'N, 12.iv.1975 (LACM); 1 ♀, Chiapas, Tapachula, Vinca Violeta (ZSBS); 1 ♀, Chiapas, 12 miles [19.3 km] N. of Ocozocoantla, 10.vii.1971 (Toulgoët Coll.); 2 ♀, 'Mexico' (BMNH, ZSBS). **Guatemala**: 1 ♂, Cerro Zunil, 4000 ft [1220 m]; 1 ♀, Las Mercedes, 3000 ft [910 m] (BMNH); 4 ♀, Depto Zacapa, La Unión, 850 m, 29.viii.–1.xi.1972 (LACM); 3 ♀, Chiblac, Barillas, Municipio Santa Cruz, 1000 m, 8.viii.–4.x.1974 (BMNH). **Honduras**: 1 ♀, Lago Yojoa, Cortes (18 km NE. of El Mochito), 20–21.viii.1974 (LACM). **Nicaragua**: 1 ♀, 5.3 miles [8.5 km] E. of Matagalpa, 30.vii.1967 (USNM). **Costa Rica**: 1 ♂, 1 ♀, Juan Vinas (BMNH, USNM); 1 ♀, San José (BMNH); 1 ♀, Candelaria Mts (BMNH); 1 ♀, Orosi, 1200 m (BMNH); 1 ♂, 1 ♀,

Cartago province, Turrialba, I.I.C.A. grounds, 600 m, 24–26.vi.1974 (LACM); 2 ♀, 'Costa Rica' (BMNH). **Panama**: 1 ♂, Chiriqui (USNM); 1 ♂, 1 ♀, Lino, 800 m (USNM). **Colombia**: 1 ♂, Antioquia, [Rio Nare] Nari River (USNM) [see species 'Distribution'] (USNM); 1 ♀, 'Colombia' (BMNH).

Halysidota atra rindgei subsp. n.

(Fig. 79)

Halysidota atra Druce; Seitz, 1922: 413, pl. 59, row e.

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–25 mm; ♀, 27–30 mm. Scape, pedicel and few basal segments of antennae orange-yellow, remainder of shaft brown. Terminal fascia of forewing usually represented by an apical marking, another between M_3 and CuA , and in most of the specimens examined by additional smaller markings on either side of the latter marking. Female abdomen dark brown dorsally (as dark as male abdomen).

DEDICATION. Named after Dr F. Rindge, ever helpful lepidopterist of the American Museum of Natural History in New York.

MATERIAL EXAMINED

HOLOTYPE ♂, **Peru**: North, River Tabaconas, 6000 ft [1830 m], 1912 (*A. E. & E. Pratt*) (BMNH).

Paratypes. **Colombia**: Rio Negro, 800 m [$3^{\circ}42'N$, $74^{\circ}48'W$] [see species 'Distribution']. **Peru**: 1 ♂, same data and depository as holotype; 4 ♀, Carabaya, Santo Domingo, 6000 ft [1830 m], dry season, vi.1902 (BMNH) (including 3 paralectotypes of *Halysidota fuliginosa* Rothschild). **Ecuador**: 4 ♂, 7 ♀, Napo, Route Baeza-Tena, Cordillera Huacomayo, 1800 m, 20.ii.–22.xii.1978, 20–21.ii.1979; 1 ♀, Napo, Puerto Misahualli, 300 m, 29.xi.1978; 2 ♀, Napo, Route Baeza-Lumbacui, Puete Azuela, 1600 m, 18.ii.1979; 3 ♀, Morona Santiago, Route Gualaceo Mendez Km 55, 1800 m, 22.i.1979; 1 ♂, 1 ♀, Zamora Chinchipe, Route Loja-Zamora Km 39, 1850 m, 26.i.1979; 1 ♀, Route Quito–Tago Agrio, 1500 m, 18.ii.1979. (All Ecuador ex. in Toulgoët Coll.) **Bolivia**: 2 ♂, 1 ♀, Cochabamba (1 ♀ from El Limbo, 2000 m, 6.xii.1962) (CM, Toulgoët Coll.); 2 ♀, Rio Songo, 750 m (BMNH); 1 ♂, Yungas de Palmar, 1100 m, xi.1960 (ZSBS).

Halysidota instabilis Dyar stat. n.

(Figs 24, 26, 80, 81)

Halysidota underwoodi instabilis Dyar, 1912: 53. Lectotype ♂, MEXICO [examined].

Halysidota underwoodi instabilis Dyar; Watson, 1971: 46, figs [lectotype designation].

DIAGNOSIS. ♂. Forewing: 27 mm. Probably indistinguishable from *donahuei* externally. Figs 24, 26 represent extreme forms of the male colour-pattern, which are matched exactly by corresponding forms of *donahuei*. In the male genitalia, *instabilis* differs from *donahuei* in the highly distinctive lateral margins of the uncus, the more elongate tegumen, the longer apical sacculus process of the valve and the shorter non-setose mid-costal process.

AFFINITIES. See *donahuei*, p. 47).

TYPE-SERIES. One of the two paralectotypes listed by Watson (1971: 47) is conspecific with the lectotype (see list of material examined); the second paralectotype (collected in August and referred to by Dyar as 'lighter in colour than the others') is a specimen of *schausi*.

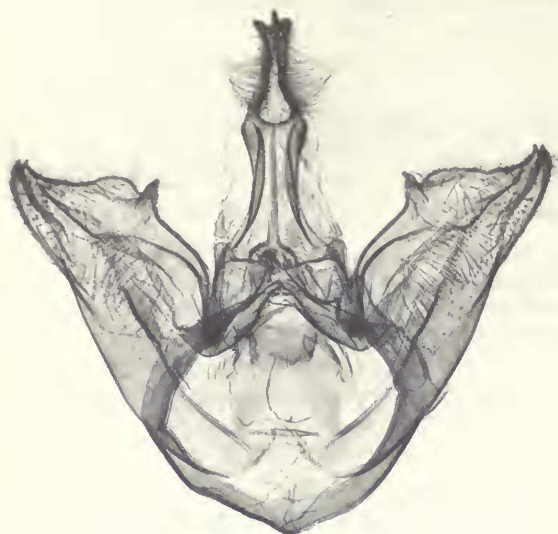
DISTRIBUTION. Mexico (but see below).

MATERIAL EXAMINED

Halysidota underwoodi instabilis Dyar, lectotype ♂, **Mexico**: [Morelos state,] Cuernavaca, June 1906 (USNM).

Mexico: 1 ♂ (paralectotype), [Morelos state,] Cuernavaca (USNM).

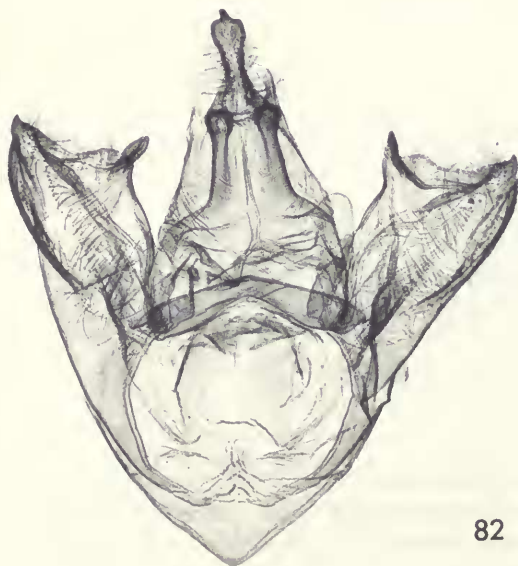
Material of doubtful identity. Nine females (Mexico, Guatemala, El Salvador) (AM, AMNH, BMNH, LACM, USNM) belong either to this species or to *H. donahuei* sp. n.



80



81



82



83

Figs 80–83 *Halysidota* ♂ genitalia. (80, 81) *instabilis* lectotype, USNM slide AW 317, Mexico. (82) *donahuei* holotype, slide 2220, Mexico. (83) *donahuei* paratype, AM slide, Mexico.

Halysidota donahuei sp. n.

(Figs 25, 82, 83)

DESCRIPTION. ♂. Forewing: 25–27 mm. Clypeofrons black dorsally, becoming yellowish brown towards labrum; vertex very pale buff. Palp black, with orange-yellow band distally on segment 1 and at middle of segment 2; segment 2 and apical segment speckled with light grey scales. Scape, pedicel and basal few segments of antenna orange-yellow above, remainder dark brown; longest antennal pectination about twice diameter of shaft at that point. Patagia and tegulae very pale buff; the former edged posteromedially, the latter medially with greenish blue; tegulae with black longitudinal streak. Rest of thorax orange-yellow, with greenish blue mid-dorsal line. Outer surfaces of legs orange-yellow, inner surfaces pale orange-yellow; markings a mixture of black and white scales, edged with black. Microtymbal number: 12. Upper surface of forewing very pale buff (or brownish white). Fasciae edged with black; yellow in costal area and at distal end of cell, otherwise pale yellowish brown. Subterminal fascia represented by marking at costa and at anal margin and in some specimens by an additional marking between M_2 and M_3 or two extra markings, the latter plus another between R_5 and M_1 . In four of the nine specimens examined, the black proximal border extends as marginal band along anal margin to basal fascia. Hind wing yellowish white, becoming more yellowish at outer margin and in anal region; pale yellowish brown markings restricted to apex of wing or to narrow marginal band extending to 1A. Under surface of wings similar to upper surface, but less well marked and fascia without yellow scales costally or in discocellular marking. Abdomen orange-yellow dorsally, very pale yellow ventrally; segments 3 to 8 with black lateral marking.

♂ genitalia. Apical costal process of valve extends distal to apical process of sacculus; setose mid-costal process poorly developed, non-setose process prominent. Vincular lobes short, about as long as broad. Lobes of tegumen moderately well developed. Uncus spatulate towards apex and with short acuminate apical process. Spinose anterior lobe of vesica with two spinose accessory lobes, one anterior, one posterior and single non-spinose lobe at its base on left-hand side; posterior lobe of vesica scobinate.

DIAGNOSIS & AFFINITIES. Separable from *instabilis* by the male genitalia (see *instabilis*). Overall similarity between these two species indicates close phylogenetic affinities; the probably apomorphic, shared character state of a laterally expanded uncus suggests that they may be monophyletic in origin.

DISTRIBUTION. Mexico (but see *instabilis*, p. 45).

MATERIAL EXAMINED

Holotype ♂, Mexico: [Vera Cruz,] Jalapa (BMNH).

Paratypes. Mexico: 1 ♂, Tamaulipas [state], near Llera, 12.vi.1970 (AMNH); 1 ♂, San Luis Potosi, Tamazunchale, 20.v.1952 (AMNH); 2 ♂, Chiapas state, Cumbre de Arriaga, 15, 16.vi.1972 (LACM); 2 ♂, 'Mexico' (BMNH).

Material of doubtful identity. See *H. instabilis* Dyar.

Halysidota cinctipes Grote sp. rev.

(Figs 1, 37–39, 84–86)

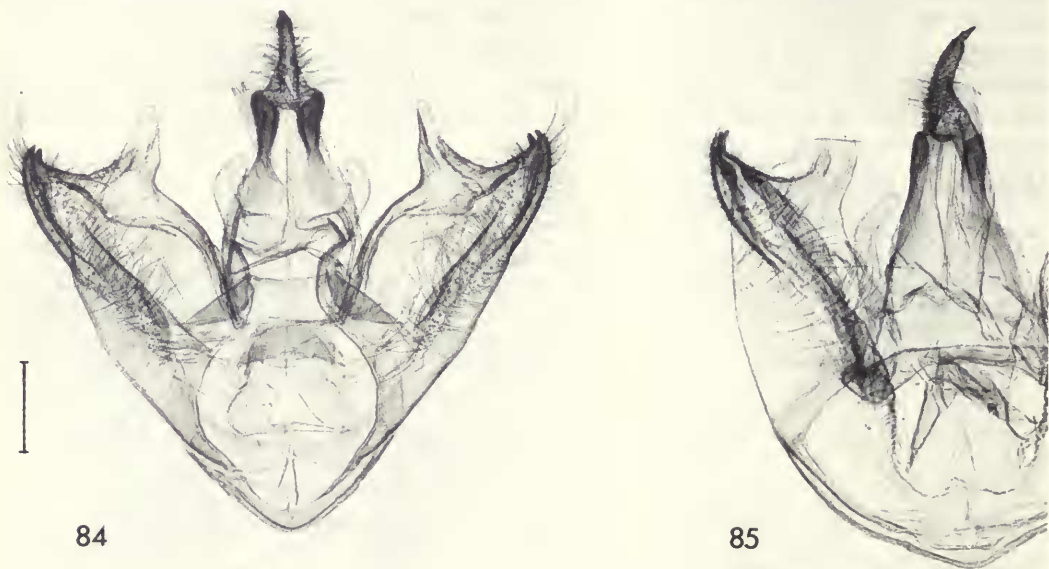
Halysidota cinctipes Grote, 1865: 242. LECTOTYPE ♂, CUBA (BMNH), here designated [examined].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 22–28 mm; ♀, 26–29 mm. Clypeofrons dark brown, becoming paler towards labrum; vertex yellowish white. Palp dark brown speckled with greyish white; basal segment with orange-yellow distal band, second segment with orange-yellow band at two-thirds distance from its base to distal margin. Antenna yellowish white to about two-thirds of its length; remainder unscaled; longest pectination (♂) about 2.25 times diameter of shaft at that point. Patagia very pale buff with blue-green posteromedial fringe. Tegulae as patagia but whole of medial fringe blue-green and with black triangular spot anteriorly in some specimens. Rest of thorax orange-yellow dorsally, with blue-green mid-dorsal line; ventral surface pale yellow with pale greenish blue area ventral to eyes and ventral to forewing. Microtymbal number: 13. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of black and white scales edged with black. Forewing pale brownish yellow; markings yellowish brown replaced by yellow in costal area and at distal end of cell, edged with dark brown. Hindwing with small brown apical marking in most specimens. Under surface of wings as upper surface but less well marked and without yellow scales on forewing. Abdomen brownish orange-yellow dorsally, pale yellow ventrally; trace of black lateral spots present in some specimens.

♂ genitalia. Apical processes of valve about equal in length in most specimens. Non-setose mid-costal process of valve very large, with setose process reduced to carina on ventral surface at base of non-setose process. Vincular lobes long and arcuate; three to four times as long as diameter at mid-point. Tegumen lobes densely spinose; longest spine 0.04 mm in length. Vesical lobes as in Fig. 86.

VARIATION. Individual variation in colour-pattern is shown in Figs 37–39. Other specimens may lack the lateral extensions of the medial fascia along the anal margin of the forewing, and in the single known Bahamian specimen the subterminal fascia is reduced to one costal marking. From the small sample of material available, it appears that pale, poorly marked specimens (Fig. 39) are predominant in Florida, whereas all five of the Cuban specimens examined are well marked (Fig. 37). The large costal process in the male genitalia varies in shape and is arcuate (curved outwards) in some specimens.

DIAGNOSIS. In Florida *cinctipes* has been confused with *tessellaris*, but differs from the latter in the partly dark brown clypeofrons, the presence of greenish blue areas on the thorax ventral to the eyes and forewings, and the presence in some specimens of the lateral extension along the anal margin of the dark brown margin of the medial fascia. An examination (from the dorsal side) of the male genitalia, after brushing away surrounding scales, should confirm the identification of North American specimens. Separable from *ata* by the presence of greenish blue areas ventral to the eyes and forewings, and in the male genitalia by the shorter spines (0.04 mm) on the lateral lobes of the tegumen and by the less heavily spinose vesica.



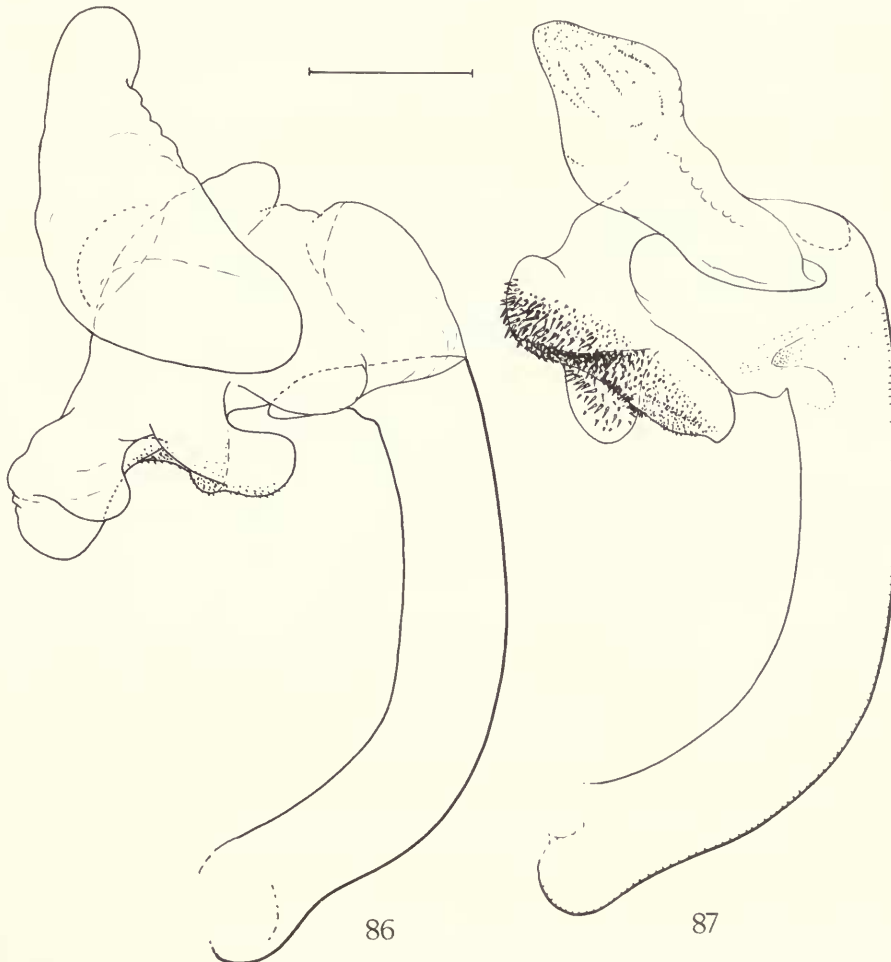
Figs 84, 85 *Halysidota cinctipes* ♂ genitalia. (84) LACM slide, Florida. (85) lectotype, NAS slide, Cuba.

RELATIONSHIPS. *H. cinctipes* is apparently replaced in the Dominican Republic and Puerto Rico by a sister-species *ata*, a relationship supported by overall similarity of these two species and by the presence in both of a greatly enlarged lobe on the costal margin of the valve, a character state interpreted as apomorphic. The sister-group of this pair has not been identified as such. Two other species, *yapacaniae* and *nigrilinea*, also have large costal lobes, but there are no other characters to support the suggestion that they are monophyletic, and it seems probable that there has been independent evolution of this character in each of these two species and in the sister-species *cinctipes* and *ata*.

STATUS. Travassos (1963: 475) placed *cinctipes* in the synonymy of *tessellaris*, an untenable action in view of the considerable differences between these two species.

DISTRIBUTION. Kimball (1965: 76) suggests that all records of this species from north of Oneco (central west-coast Florida) are suspect because of the past confusion between *cinctipes* and *tessellaris* in Florida. The northernmost specimen I have examined is from Port Sewall in Martin County. Elsewhere *cinctipes* has been identified from the Bahamas and the type-locality, Cuba. References in the literature to Puerto Rican material apply to *ata*; all other references are based probably on misidentifications. None of the names and localities associated with *cinctipes* (except for '*ata* Strand') by Strand (1919: 73, 74) refer to this species.

EARLY STAGES. Dyar (1896: 450–451) described the last three instars of the larval stage, which he summarized as 'like *tessellaris* but dark brown or silver grey brown with all the hair tufts white', and briefly described the cocoon. Dyar (1896: 451) gave the foodplants of specimens collected near Lake Worth, Florida, as Sea Grape, *Coccoloba floridana*, and *C. uvifera* (Polygonaceae) and suggested that *Hibiscus*, as recorded by Gundlach (1886: 269), is not a normal foodplant of *cinctipes*. Slosson (1901: 202) recorded *Trema micrantha* (Ulmaceae) as a foodplant in Miami, Florida, but this may be based on a misidentified larva as she stated that the larvae closely resembled *tessellaris* ('*H. tessellata*').



Figs 86, 87 *Halysidota* ♂ genitalia. (86) *cinctipes* aedeagus, lectotype, NAS slide, Cuba. (87) *ata* aedeagus, USNM slide, Dominican Republic.

MATERIAL EXAMINED

Halisidota cinctipes Grote, lectotype ♂, **Cuba** (*Poey*) (NAS).

Cuba: 3 ♂, Matanzas, v (AMNH, USNM); 1 ♂, Pinar del Río (USNM); 1 ♂, [Havana] La Havane, 1908 (MNHN). **Bahamas**: 1 ♂, Nassau (BMNH). **U.S.A.**: 1 ♂, Florida, [Martin County,] Port Sewall (AMNH); 3 ♂, F., [Dade County,] Homestead, 2.ix.1958, 8.ii.1959 (AMNH, LACM, USNM); 4 ♂, 2 ♀, F., [Dade County,] Florida City, 21.iv, 2–5.v, 18.ix, 29.xi.1936, 1937, 1941 (AMNH, LACM); 1 ♂, F., [Dade County,] Biscayne Bay (AMNH); 1 ♂, F., [Dade County,] Royal Palm State Park (USNM); 1 ♂, F., Munroe County, Tavernier, 17.x.1955 (USNM); 1 ♂, 1 ♀, F., Munroe County, 18.ii.1960, 20.ix.1966 (LACM, USNM); 2 ♂, 'Florida' (USNM).

Halisidota ata sp. n.

(Figs 40–42, 87)

Halisidota cinctipes Grote 'Ab. 1' Hampson, 1901: 160.

Halisidota cinctipes Grote ab. *ata* Strand, 1919: 77. Holotype ♂, DOMINICAN REPUBLIC (BMNH) [examined]. [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26–29 mm; ♀, 29–32 mm. As for *cinctipes* but distinguished by the lack of greenish blue areas on the thorax ventral to the eyes and forewings, and in the male by the longer spines (0.07 mm) on the lateral lobes of the tegumen and by the more heavily spinose vesica.

VARIATION. This occurs principally in the size of the discocellular marking which may be conspicuous as in the holotype or greatly reduced as in Figs 41, 42. The forewing ground-colour of most of the Dominican specimens is more greyish than that of the six Puerto Rican specimens examined.

STATUS. Strand (1919: 77) gave the infrasubspecific name *ata* to the specimen described by Hampson (1901: 160) as *H. cinctipes* Ab. 1. The name *ata* is here elevated to species-group rank and becomes *ata* Watson under Article 10(b) of the *Code*.

RELATIONSHIPS. (See *cinctipes*.) I have chosen to treat *ata* as a distinct species, not as a subspecies of *cinctipes*, because of the extent of the differences between these two taxa.

DISTRIBUTION. Known only from the Dominican Republic and Puerto Rico.

MATERIAL EXAMINED

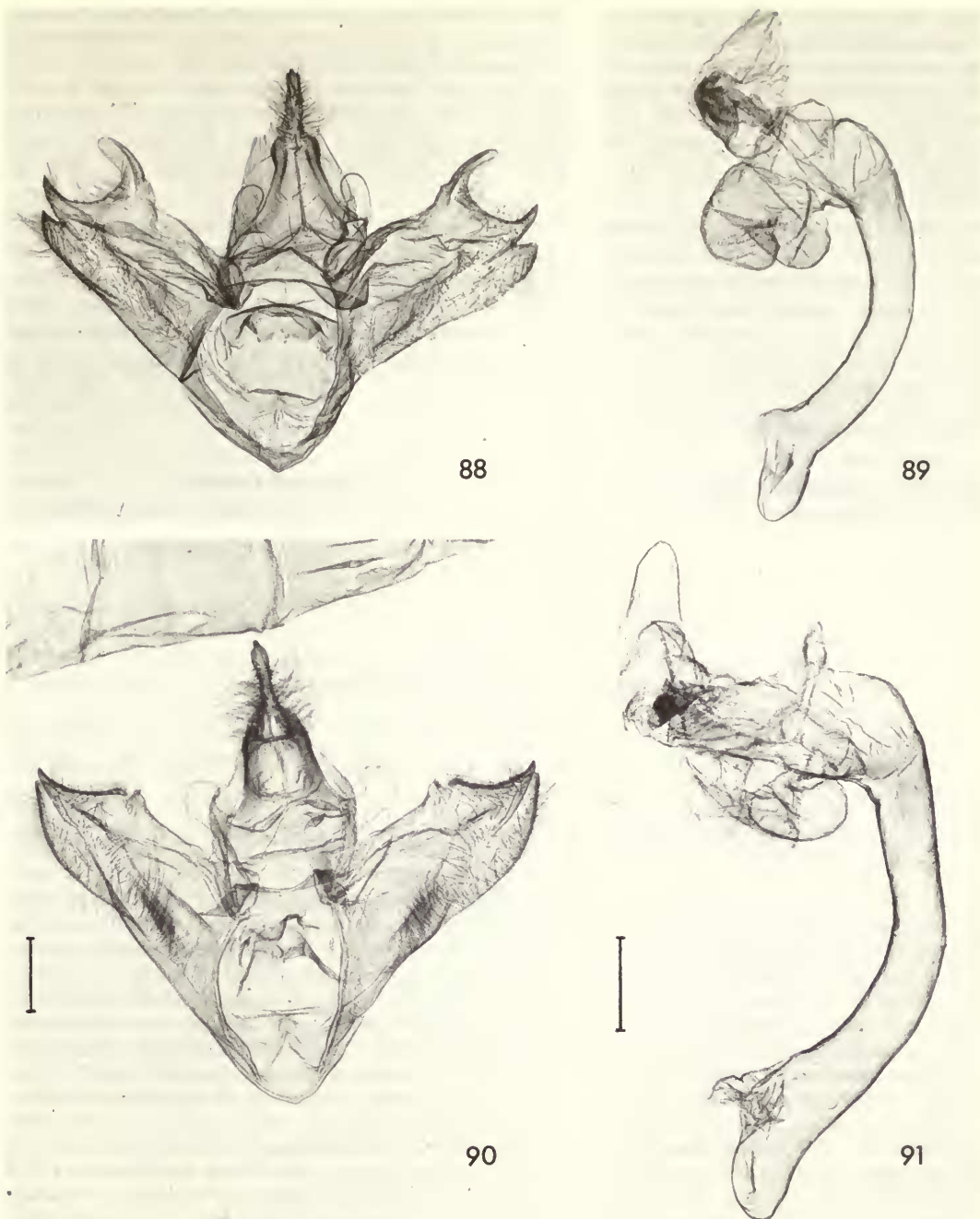
Holotype ♂, **Dominican Republic**: Santo Domingo (*Tweedie*) (BMNH).

Paratypes. **Dominican Republic**: 1 ♂, La Vega province, Hotel Montana, c. 520 m, 10 km NE. of Jarabacoa, 28.v.1973 (USNM); 1 ♂, 1 ♀, La Vega province, Constanza, 1164 m, Hotel Nueva Suiza, 29.v.1973 (USNM); 1 ♂, 1 ♀, La Estrelleta province, 4 km SE. of Rio Limpio, c. 760 m, 24–25.v.1973 (USNM); 7 ♂, 5 ♀, Dajabon province, 13 km S. of Loma de Cabrera, c. 400 m, 20–22.v.1973 (USNM); 1 ♂, 1 ♀, Convento, 12 km S. of Constanza, 6–13.vi.1969 (USNM); 1 ♀, Los Hidaigos, 4–5.vi.1969 (USNM); 2 ♀, El Seibo province, 15 km S. of Miches, c. 500 m, 31.v.1973 (USNM). **Puerto Rico**: 3 ♂, 1 ♀, Pico del Este, El Yunque Radar Station, 1000 m, 5–6.i.1971 (USNM); 1 ♂, Loquillo Exp. Forest, El Verde Field Station, 435 m, 1–21.i.1971 (USNM); 1 ♂, Laguna Guajataca, Boy Scout camp, 205 m, 2–5.iv.1971 (USNM).

Halisidota nigrilinea sp. n.

(Figs 45, 88, 89)

DESCRIPTION. ♂ and ♀. Forewing: ♂, 23–26 mm; ♀, 27 mm. Clypeofrons dark brown with some greyish white scales; vertex pale buff with some blue-green tipped scales dorsally. Basal segment of palp orange-yellow with distal border dark brown, or dark brown with anterior fringe orange-yellow; segment 2 a mixture of greyish white and dark brown scales (mostly greyish white) with dark brown bordered orange-yellow spot at middle laterally; apical segment greyish white with some dark brown scales. Antennal scape, pedicel and base of shaft orange-yellow; longest antennal pectination about 2.25 times diameter of shaft at that point. Patagia orange-buff with broad blue-green posterior border. Tegulae orange-buff bordered medially and posteriorly with blue-green and with black longitudinal streak at middle. Rest of thorax orange-yellow dorsally with blue-green mid-dorsal line; ventral surface orange-yellow with dark brown



Figs 88-91 *Halysidota* ♂ genitalia. (88, 89) *nigrilinea* paratype, CM slide, Bolivia. (90) *intensa*, LACM slide, Peru. (91) *intensa*, slide 2223, Ecuador.

area lateral and ventral to eye. Microtymbal number: 12. Outer surface of legs orange-yellow, inner surface pale yellow; markings a mixture of greyish white and black scales edged with black. Forewing pale buff; markings yellowish brown edged with dark brown, except in costal area where the fasciae are orange-yellow; veins marked with dark brown scales. Hind wing yellowish white, becoming more strongly yellowish at base, anally and at outer margin; small brown apical marking present. Under surface of wings as upper

surface but paler and fasciae lack yellow costally. Abdomen orange-yellow dorsally, pale yellow ventrally.

♂ genitalia. Apical process of costa extends distal to that of sacculus; non-setose mid-costal process very large; setose process reduced to carina at base of non-setose process. Vincular lobes about twice as long as diameter at mid-point. Tegumen lobes moderately well developed; spines clearly visible at $\times 32$ magnification. Vesica with scobinate bilobate anterior part and tapered posterior lobe, the latter with smaller scobinations than on anterior lobes. [The dorsal lobe of the anterior pair of lobes is tapered and extends to the right (away from the viewer) in Fig. 89 which is of a photograph taken from the morphological left-hand side.]

DIAGNOSIS. Probably likely to be confused only with the Argentinian *tucumanicola*, but the regular borders of the subterminal and terminal fascia contrast with the irregular lunulate borders of these fasciae in *tucumanicola*, and most specimens of *nigrilinea* have conspicuously marked veins where these cross the fasciae. *H. yapacaniae* has similarly large non-setose processes on the costal margin of the valve, an apomorphic character state which may link it with *nigrilinea*, but this hypothesis is not supported by overall similarity in colour-pattern, nor by other identifiable apomorphic characteristics.

DISTRIBUTION. Argentina and Bolivia.

MATERIAL EXAMINED

Holotype ♂, **Argentina**: Jujuy province, Yala, 1450 m, 20.ii.1955 (Foerster) (ZSBS).

Paratypes. **Argentina**: 17 ♂, 8 ♀, Jujuy province, Yala, 1450 m, 20.ii.1955 (Foerster) (ZSBS). **Bolivia**: 1 ♂, 1 ♀, Cochabamba (Steinbach) (CM).

Halysidota intensa Rothschild **nom. rev., stat. n.**

(Figs 43, 44, 90, 91)

Halysidota interlineata intensa Rothschild, 1909: 283. LECTOTYPE ♂, PERU (BMNH), here designated [examined].

Halysidota interlineata intensa Rothschild; [Rothschild.] 1911: pl. 11, figs 12, 13.

Halysidota interlineata ab. *subterminalis* Strand, 1919: 76. Holotype ♂, COSTA RICA (BMNH) [examined] [Infrasubspecific name.]

DESCRIPTION. ♂ and ♀. Forewing: ♂, 26–32 mm; ♀, 29–35 mm. Clypeofrons black; with few pale buff scales dorsomedially in few specimens. Vertex pale buff; dorsomedial scales tipped with bluish green. Palp black, speckled with greyish white; orange-yellow patch anteriorly at apex of segment 1 and laterally on segment 2 about two-thirds distance from base to apex. Antennal scape, pedicel and basal few segments of shaft orange-yellow; longest antennal pectination (♂) 1.50 to 1.75 times diameter of shaft at that point. Patagia pale buff with bluish green posterior band. Tegulae pale buff fringed medially with bluish green. Small black marking present or absent at middle of each tegula. Rest of thorax orange-yellow dorsally with bluish green mid-dorsal line; pale orange-yellow ventrally with dark brown area ventral to eye and in lateral band extending from a point ventral to anterior margin of patagia to below costal area of forewing base. Microtymbal number: 13 to 16. Outer surface of legs orange-yellow, inner surface pale yellow; markings black speckled with greyish white and edged with black. Forewing pale, slightly brownish yellow; markings pale yellowish brown, edged with black but a mixture of black and orange-yellow in costal area and in discocellular marking. Veins with black or dark brown scales where they intersect fasciae (especially noticeable in medial fascia and apical part of terminal fascia). Hind wing pale yellow or yellowish white, most intensely yellow anally, with single small brown apical marking. Under surface of wings as upper surface but paler, lacking orange-yellow scales, and with black scales replaced by dark brown; costal margin of hind wing with dark-edged yellowish brown marking at mid-point in some specimens. Abdomen orange-yellow dorsally, pale yellow ventrally; black spot or band present laterally on segments 3–8 (♂) or 3–6 (♀) and in some specimens a transverse black mid-ventral band or mid-ventral spot at posterior margin of segments 3 and 4.

♂ genitalia. Apical costal process of valve extending distal to apical process of sacculus. Non-setose mid-costal process continued distally as thin arcuate flange to base of apical process; setose process of costa partly enclosed by concavity formed near base of non-setose process. Vincular processes arcuate; length

about twice as great as breadth at mid-point. Lobes of tegumen elongate, hardly expanded laterally; spines readily visible at $\times 32$ magnification. Scobinate tapered anterior lobe of vesica with two accessory lobes on left-hand side, one towards its apex and equally strongly scobinate, another less heavily scobinate lobe near its base; elongate posterior lobe weakly scobinate; smaller unornamented digitate lobe on right-hand side of vesica.

VARIATION. The discocellular marking on the forewing of most specimens is connected to the costal element of the medial fascia, but is separate in a few specimens. Also variable individually is the completeness of the subterminal fascia which can be reduced even further than in Fig. 44 to three separate markings, or complete and unbroken; many specimens lack the subterminal marking between R_4 and R_5 . A male, from Santo Domingo, Peru, has a terminal fascia composed of individual interneural spots. The presence or absence of a costal marking on the under surface of the hind wing and of mid-ventral abdominal markings has been mentioned in the description of *intensa*.

DIAGNOSIS. In South America, *intensa* is probably most likely to be confused with heavily marked *underwoodi* or with *pectenella* but can be separated by the generally less strongly convex outer margin of the forewing, the generally larger and darker discocellular markings on the forewing, by the male genitalia and (from *pectenella*) by the larger size. Distinguished from the smaller Central American *interlineata* by the presence on the forewing of at least one subterminal marking between the costal and anal markings. (The illustration in Seitz (1922: pl. 59) is inaccurate, especially in the subterminal area of the forewing, but gives a fair indication of the overall colour-pattern.)

STATUS. Travassos (1963: 476) incorrectly placed *interlineata intensa* in the synonymy of *tessellaris*. This placement is here corrected and the name *intensa* elevated to specific rank. Strand (1919: 76) gave the name ab. *subterminalis* (employed in an infrasubspecific sense) to Hampson's *H. interlineata* 'Ab. 1', a normally marked male specimen of *intensa* from Costa Rica.

DISTRIBUTION. Guatemala, Costa Rica, Honduras, Colombia, Venezuela, Ecuador, Peru and Bolivia.

MATERIAL EXAMINED

Halisidota interlineata intensa Rothschild, lectotype ♂, **Peru**: Carabaya, Rio Huacamayo, La Union, 2000 ft [610 m], wet season, xii.1904 (*Ockenden*) (BMNH). *Halisidota interlineata* ab. *subterminalis* Strand, holotype ♂, **Costa Rica**: Candelaria Mts (*Underwood*) (BMNH).

Guatemala: 2 ♂, Cayuga (LACM, MNHN). **Honduras**: 1 ♂, La Cambre (BMNH); 2 ♀, San Juancito (AMNH). **Costa Rica**: 2 ♂, 1 ♀, Tuis (BMNH, CM); 2 ♂, San José (BMNH, MNHN); 2 ♂, Asahar de Cartago, ii.1899 (BMNH) (paralectotypes of *H. intensa* Rothschild); 2 ♂, Puntarenas province, 4 miles [6.5 km] S. of San Vito, Las Cruces Field Station (OTS), 26–27.vi.1972 (LACM); 6 ♂, 5 ♀, 'Costa Rica' (BMNH, MNHN). **Colombia**: 4 ♂, 1 ♀, Upper Rio Negro, 800 m (BMNH); 1 ♂, Medina, 500 m (BMNH); 1 ♂, Cundinamarca, Monterredondo, 1420 m, 17.iii.1961 (ZSBS); 2 ♀, Cundinamarca, 3 km N. of Alban, Finca San Pablo, 1800 m (AMNH); 1 ♂, 2 ♀, Don Amo, 2000 ft [610 m] (BMNH); 1 ♂, Mocoa, 530 m, 20–30.v.1922 (ZSBS); 1 ♂, Muzo, 400–800 m (BMNH). 2 ♀, 'Colombia' (AMNH). **Venezuela**: 2 ♀, Mérida (BMNH) (paralectotypes of *intensa*); 1 ♂, 1 ♀, Caracas (BMNH); 1 ♂, San Esteban, vii.1909 (BMNH); 1 ♂, La Puerta, 1250 m, 12.ii.1953 (USNM); 1 ♀, Aragua, Rancho Grande, 1100 m, 2.xi.1951, 2.viii.1962 (Toulgoët Coll.); 1 ♂, 1 ♀, Cucuta (BMNH); 6 ♂, 2 ♀, near St Esteban, Las Quigas (BMNH, CM). **Ecuador**: 1 ♂, Tinlandia, Route Santo Domingo, I.G. Quito km 16, Pichincha, 650 m, 19–22.i.1975 (Toulgoët Coll.); 1 ♀, Santo Domingo, Pichincha, 750 m, 18–19.iv.1977 (BMNH); 1 ♂, West, Napo, Lumbaqui, Texaco station, 850 m, 4–5.xi.1975 (BMNH); 1 ♀, 'Ecuador' (AMNH). **Peru**: 5 ♂, south-east, Carabaya, Santo Domingo, 6000 ft [1830 m], dry season, vi.1902 (BMNH); 1 ♂, 2 ♀, south-east, Carabaya, Santo Domingo, 6500 ft [1980 m], wet season, xi.1902, i.1903 (BMNH) (paralectotypes of *intensa*); 1 ♂, Tingo Maria, 29.i.1950 (USNM); 2 ♀, northern, Tabaconas River, 6000 ft [1830 m], 1912 (BMNH); 1 ♂, Navai Tachera, iv.1971 (Toulgoët Coll.); 1 ♂, Dept. Pasco, 22 km SE. of Iscozazin, Chontilla, 10.vii.1961 (LACM); 4 ♂, 5 ♀, Northern, Upper Maranon, Rentema Falls, 1000 ft [300 m] (BMNH); 1 ♀, Inambari River, 1918 (BMNH); 1 ♂, Yahuaranayo, 1200 ft [370 m], v–vii.1912 (BMNH). **Bolivia**: 1 ♂, 1 ♀, Rio Songo, 750 m (BMNH).

(The few paralectotypes of *H. intensa* listed represent all those which could be identified as such with certainty from a possible 17 ♂ and 10 ♀.)

Halysidota interlineata Walker

(Figs 46, 92, 93)

Halesidota interlineata Walker, 1855: 739. LECTOTYPE ♀, BRAZIL (BMNH), here designated [examined]. *Phegoptera jucunda* Herrich-Schäffer, [1855]: fig. 285 (wrapper). LECTOTYPE ♂, BRAZIL (MNHU), here designated [examined].

Halesidota interlineata Walker; Herrich-Schäffer, 1858: 81 (synonymy of *H. jucunda* with *H. interlineata*).

DESCRIPTION. ♂ and ♀. Forewing: ♂, 20–23 mm; ♀, 23–27 mm. Clypeofrons dark brown, vertex pale buff. Palp dark brown speckled with white anteriorly; basal segment yellow apically; second segment with small yellow lateral spot in some specimens just distal to mid-point. Antenna orange-yellow from base to about segment 20, brown to about segment 30, then yellow to near apex in most specimens; longest antennal pectination 1.5 times diameter of shaft at that point. Patagia pale buff, fringed posteromedially with greyish green. Tegulae pale buff fringed medially with greyish green; usually without markings but may have small black streak in middle towards anterior margin. Rest of thorax orange-yellow dorsally with greyish green mid-dorsal line; orange-yellow ventrally, with dark brown area from eye to base of forewing. Outer surface of legs orange-yellow, inner surface pale buff; markings a mixture of greyish white and black, edged with black. Microtymbal number: 11 to 13. Forewing pale buff above, markings yellowish brown edged with black, but costal and discocellular markings a mixture of orange-yellow and black. Subterminal fascia absent (rarely) or represented by a costal and an anal marking (most specimens) or by only one of these markings. Terminal fascia unicolorous, veins not emphasized by darker scales. Under surface of forewing as upper surface, but markings less distinct and orange-yellow coloration absent. Hindwing pale yellow; upper surface becoming orange-yellow anally and at outer margin; small brown apical marking present in a few specimens. Abdomen orange-yellow dorsally, pale buff ventrally; black lateral spots or dashes present on segments 3 to 8 (♂) or 3 to 6 (♀).

♂ genitalia. Apical sacculus process of valve extending distal to apical costal process; the latter dilate pre-apically; non-setose mid-costal process large and angulate; setose costal process small. Vincular lobes arcuate; length about three to four times least diameter. Lateral lobes of tegumen weakly developed; spines barely visible at $\times 80$ magnification. Anterior lobe of vesica scobinate apically, with small scobinate accessory lobe on left-hand side near apex. Two non-scobinate lobes at base of anterior lobe: one directed dorsally, the other ventrally. Tapered posterior lobe of vesica weakly scobinate.

VARIATION. The examined specimens are fairly uniform in coloration and colour-pattern. Apart from the already described variation of the subterminal fascia, the only noticeable difference in colour-pattern between specimens is exhibited in the medial fascia of the forewing which is extended proximally as a narrow black line along the anal margin of the wing in a few specimens.

DIAGNOSIS. In coloration and colour-pattern this species is similar to *pectenella* but lacks subterminal markings except at costa and anal margin, has a larger darker discocellular marking, and a unicolorous terminal fascia unlike most specimens of *pectenella*. Specimens of *intensa* with a poorly marked subterminal fascia could be mistaken for *interlineata* but generally have a less strongly arcuate outer margin to the forewing than in *interlineata* and have dark-coloured veins crossing the terminal fascia. The male genitalia of both *pectenella* and *intensa* differ in several respects from those of *interlineata*.

FOODPLANTS. Lima (1949: 224) reported 'amoreira' [*Morus*] as a foodplant in Brazil. He recorded the duration of the larval stage as 40 days, and of the pupal stage also as 40 days.

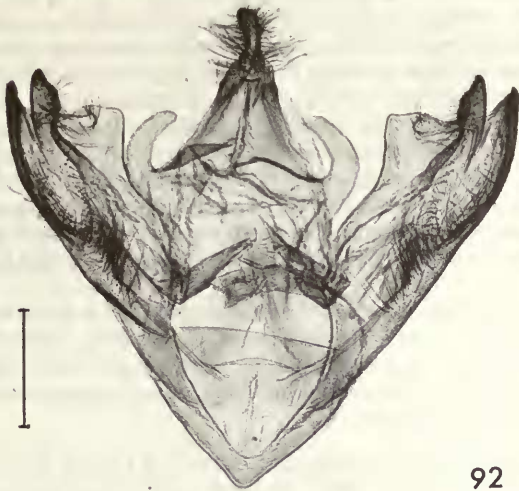
DISTRIBUTION. I have examined specimens from Guatemala southwards to southern Uruguay, but Travassos (1963: 486) includes Mexican material (Oaxaca) in his list of studied material. Kimball (1965: 75) suggests that an earlier record from Florida of *interlineata* was probably based on a misidentification of *cinctipes*.

MATERIAL EXAMINED

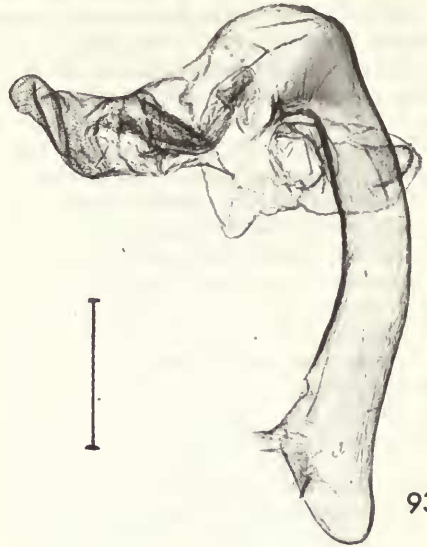
Halesidota interlineata Walker, lectotype ♀, **Brazil**: (? Bras) (BMNH). *Phegoptera jucunda* Herrich-Schäffer, lectotype ♂, **Brazil** (MNHU).

Guatemala: 1 ♀, Izabal, Ruinas de Quiriguá, 24–25.viii.1974 (LACM); 3 ♂, 2 ♀, Cayuga (CM, BMNH, USNM). **Belize**: 1 ♂, 2 ♀, Rio Grande (BMNH); 1 ♂, 'Brit. Honduras'. **Panama**: 4 ♂, Canal Zone, Barro Colorado Island, 14.iii.–20.v, 1941–1964 (AMNH, USNM); 1 ♂, 'Panama' (USNM). **Colombia**: 1 ♂, Rio

Negro, 800 m (BMNH). **Venezuela:** 1 ♂, San Esteban, Las Quiguas (BMNH); 1 ♂, Aroa (USNM); 1 ♂, Mérida (BMNH); 1 ♂, Miranda, Parque Nac. Guatopo, La Macanilla, 500 m, 8.v.1975 (UCV); 1 ♂, Aragua, La Isleta, Choroni, 200 m, 14.vii.1975 (UCV); 1 ♂, Aragua, Rancho Grande, 12.vii.–16.viii.1976 (BMNH). **Surinam:** 1 ♀, 'Surinam' (BMNH). **French Guiana:** 2 ♂, 5 ♀, Cayenne, 1875 (BMNH, MNHN); 3 ♂, 9 ♀, Guyane française (BMNH). **Brazil:** 1 ♂, Pará (BMNH); 2 ♂, 1 ♀, Rio de Janeiro, 22.viii.1912 (BMNH, MNHN); 2 ♂, São Paulo, Alto de Serra, vi.1926 (BMNH); 1 ♂, Sta Catarina, Marumbi, 16.x.1966 (BMNH); 1 ♂, Rio State, Terezopolis, Barreira, 350 m, 30.x.1931 (BMNH); 1 ♀, Rio State, Soperbo, 900 m, 28–29.x.1951 (BMNH); 1 ♀, [Rio State,] Municipio de Magé, Guapimirim, 5–6.ix.1959 (BMNH); 2 ♂, Brazil (MNHN). **Uruguay:** 1 ♀, Montevideo (BMNH).



92



93



94



95

Figs 92–95 *Halysidota* ♂ genitalia. (92) *interlineata*, slide 2343, São Paulo. (93) *interlineata*, UCV slide, Venezuela. (94) *fumosa*, LACM slide, Costa Rica, near Rincon. (95) *fumosa*, LACM slide, Costa Rica, Orosi.

Halisidota fumosa Schaus nom. rev., stat. n.

(Figs 47, 94, 95)

Halisidota cinctipes fumosa Schaus, 1912: 38. Lectotype ♂, COSTA RICA (BMNH) [examined] (designated by Watson, 1971: 37).

DESCRIPTION. ♂ and ♀. Forewing: ♂, 24–28 mm; ♀, 28 mm. Clypeofrons either completely black, or black dorsally and laterally but otherwise brownish grey; vertex brownish buff. Palp black except for grey anterior fringe to basal segment. Scape, pedicel and basal few segments of antennal shaft orange-yellow, remainder unscaled. Longest antennal pectination about 2.5 times diameter of shaft at that point. Patagia light brown, with trace of greyish blue-green posteromedially. Tegulae light brown with conspicuous black longitudinal stripe; each fringed laterally with orange-yellow, and medially with hair-scales that are buff proximally and greyish blue-green distally. Rest of dorsal surface of thorax orange-yellow with greenish grey mid-dorsal line and grey posteromedial margin. Ventral and lateral surfaces of thorax orange-yellow, with black band extending from eye to base of forewing on each side. Microtymbal number: 12–13. Outersurface of legs orange-yellow, inner surface pale buff; markings either black or black speckled with grey. Forewing pale buff or brownish buff above; markings chiefly brown or greyish brown intersected by dark brown veins and edged with black; discocellular and costal markings orange-yellow and more heavily edged with black. Under surface of forewing as upper, but markings less well defined and fascia uniformly greyish brown except for trace of yellow in discocellular marking. Hindwing becoming orange-yellow apically, pale greyish brown with brown apical marking or markings, continued as brown band along outer margin in some specimens. Abdomen orange-yellow dorsally, greyish buff ventrally; black segmental lateral dashes on segments 3 to 8 (♂) or 3 to 6 (♀) and with black transverse mid-ventral spots or bands in some specimens, the latter forming continuous broad mid-ventral black band in one female examined.

♂ genitalia. Apical sacculus process of valve extending distal to apical costal process; both acuminate. Non-setose mid-costal process concave medially; setose process present as carina at base of former. Vincular processes robust, arcuate; about twice as long as diameter at mid-point. Tegumen distinctively broader posteriorly; spines of lateral lobes just visible at $\times 32$ magnification. Uncus short, approximately pyriform in shape. Middle of three distal lobes of vesica scobinate.

VARIATION. An Ecuadorian male (BMNH) has darker hind wings and forewing fasciae than in the illustrated example, lacks subterminal markings between veins M_3 and CuP on the forewing and lacks the antemedial marking at the anal margin of the forewing. Variation in the extent of the hind wing and abdominal markings are mentioned in the description.

DIAGNOSIS. Externally likely to be confused with small dark examples of *underwoodi*, but lacks yellow on the basal segment of the palp and has a less distinctly arcuate discocellular marking. Identification of males can be confirmed by an examination of the uncus which is usually visible dorsally in set specimens. The tegumen and vesica in the male genitalia are also highly diagnostic.

STATUS. The name *fumosa* was established as a subspecific name and subsequently relegated to infrasubspecific rank by Seitz (1922: 412) as 'ab. *fumosa*'. Travassos (1963: 476) reinstated the name as *Halisidota cinctipes fumosa* Schaus and at the same time placed it incorrectly in the synonymy of *tessellaris*. Travassos's error is here corrected and *fumosa* is recognized as the name of a distinct species.

LECTOTYPE. The original syntypic series of *fumosa* probably comprised two specimens: the specimen subsequently selected as lectotype and another male from Juan Viñas, Costa Rica. The latter specimen (Fig. 47) was not located by the author in 1971 (Watson, 1971: 37) but has been traced subsequently. The lectotype is the only specimen which had been labelled previously in the USNM collection with a red 'Type' label.

DISTRIBUTION. Costa Rica, Colombia and Ecuador.

MATERIAL EXAMINED

Halisidota cinctipes fumosa Schaus, lectotype ♂, Costa Rica: Sixola R., iii (USNM) [examined].

Costa Rica: 1 ♂, Juan Viñas, vi (USNM) (paralectotype of *fumosa*); 1 ♂, Vulkan Irazu, Orosi, 1200 m (BMNH); 2 ♂, 1 ♀, Puntarenas province, Osa Peninsula, 1.8 miles [2.9 km] W. of Rincon, 5, 21, 22.ii.1971 (LACM). Colombia: 1 ♂, Cali (MNHN). Ecuador: 2 ♂, 1 ♀, St Domingo, Pichincha, 750 m, 18–19.iv.1977 (BMNH); 1 ♀, Tinlandia, [near] Santo Domingo, 700 m, 16–19.vi.1977 (ZSBS).

Halysidota masoni (Schaus)

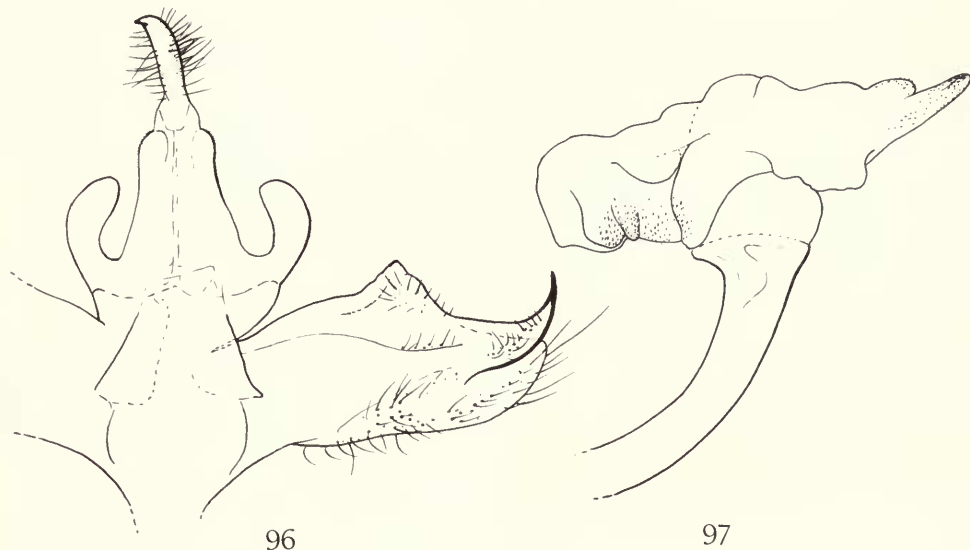
(Figs 48, 96, 97)

Phaegoptera masoni Schaus, 1895: 29. Lectotype ♀, MEXICO (USNM) [examined] (designated by Watson, 1971: 57).

Halysidota masoni (Schaus); Hampson, 1901: 162.

Halysidota masoni (Schaus); Seitz, 1922: 413, pl. 59, row g [good illustration].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 35 mm; ♀, 32–37 mm. Head orange-yellow, with or without small dark brown patch on each side of clypeofrons. Basal segment of palp orange-yellow, segment 2 black with orange-yellow posterolateral patch, segment 3 black. Antennae orange-yellow basally to segment 3 of shaft, dark brown to mid-point, then unscaled. Longest antennal pectination twice (♂) or 1.75 (♀) times diameter of shaft at that point. Patagia orange-yellow, without markings; tegulae orange-yellow, each with black spot anterolaterally; rest of thorax orange-yellow. Microtymbal number: 13. Coxa and trochanter of foreleg orange-yellow; femur mainly orange-yellow, but black distally; tibia and tarsus black. Mesothoracic and metathoracic legs similar, but mesothoracic femur may have a black spot towards distal end of outer surface and tibiae of both legs may possess an orange-yellow patch proximally. Forewing orange-yellow above with yellowish grey-white, black-edged marking. Distal to discocellular marking a black subterminal line (incomplete in costal half of wing in some specimens) is edged distally with yellowish grey-white; rest of distal part of wing pale orange-yellow with black veins. Colour-pattern of ventral surface of forewing as upper surface, but fascia completely dark brown and subterminal line edged distally with dark brown. Hind wing pale orange-yellow. Abdomen orange-yellow with black lateral and posteroventral markings on segments 3–8 (♂) or 3–6 (♀).



Figs 96, 97 *Halysidota masoni* ♂ genitalia, slide 2346.

♂ genitalia. Apical costal process of valve extending distal to apex of sacculus; non-setose process of costa angulate apically, weakly concave dorsally; setose process not well-differentiated but present as weak ridge along distal margin of non-setose process. Vincular process about three times as long as least diameter. Lobes of tegumen well-developed; spines just visible at $\times 32$ magnification. Anterior lobe of vesica with small preapical lobe on left-hand side and two further lobes at base.

DIAGNOSIS AND AFFINITIES. Readily separable from the rest of its group by the rich orange-yellow ground colour and the nearly white fasciae of the forewing, and by the absence of a terminal fascia. *H. masoni* lacks blue-green fringes to the tegulae and patagia (as *elota* and *leda*) and lacks a mid-dorsal line on the thorax (as *leda*).

The sister-species of *masoni* may not exist today, but its sister-group may comprise the other 26 externally homogeneous species of Subgroup A (see 'Phylogeny', p. 3).

DISTRIBUTION. Mexico.

MATERIAL EXAMINED

Phaegoptera masoni Schaus, lectotype ♀, Mexico: Jalapa (USNM) [examined].

Mexico: 1 ♀, Vera Cruz state, Huatuxco (BMNH); 1 ♂, [Vera Cruz state,] Orizaba (BMNH); 1 ♀, [Morelos state,] Cuernavaca (BMNH); 1 ♂, [Morelos state,] [Cuernavaca] Quernavaca, vi.1939 (ZSBS); 1 ♂, 1 ♀, 'Juxpan' (ZSBS).

Halysidota elota (Möschler) comb. rev.

(Figs 98–101)

Halesidota elota Möschler, 1886: 33, fig. 29. Holotype ♀, JAMAICA (MNHU) [examined].

Euhalsidota elota (Möschler); Kirby, 1892: 209.

Opharus elota (Möschler); Seitz, 1922: 400, pl. 57, row e [poor fig.].

DESCRIPTION. ♂ and ♀. Forewing: ♂, 30–34 mm; ♀, 30–33 mm. Clypeofrons black, vertex greyish yellow. Palp black, with orange-yellow apical band on basal segment and orange-yellow antero-apical patch on segment 2. Scape of antenna orange-yellow, with black ventral patch; pedicel orange-yellow dorsally, brown ventrally; flagellum brown; longest antennal pectination three times (♂) or twice (♀) diameter of shaft at that point. Patagia greyish yellow, darkest posteriorly; tegulae greyish yellow, fringed medially with greyish brown, without markings. Rest of thorax orange-yellow dorsally, with greyish brown mid-dorsal line; ventrally orange-yellow with dark brown band extending from ventral to eyes to base of hind wing. Microtymbal number: 11. Outer surface of legs orange-yellow, inner surface pale yellow; banded and spotted with black. Forewing brownish orange-yellow banded with yellowish brown, and with darker brown anal margin; black basal spot present; discocellular marking weak. Hind wing pale orange-yellow with one or more yellowish brown apical markings. Under surface of wings similar, or with markings more clearly defined than on upper surface. Abdomen orange-yellow dorsally, pale yellow ventrally; with lateral row of black spots on each side of segments 3–8 (♂) or 3–6 (♀).

♂ genitalia (Figs 99, 100). Shoulders of tegumen scobinate; scobinations just visible at ×32 magnification. Left-hand lobe of vesica scobinate, right-hand lobe spinose.

♀ genitalia (Fig. 98). Anterior apophyses about twice length of posterior apophyses. Corpus bursae armed with rows of inwardly directed spines (readily discernible at ×80 magnification).

DIAGNOSIS. See 'Phylogeny' (p. 4).

REMARKS. The holotype is almost devoid of colour-pattern, which probably accounts for the fact that *elota* has not been associated with the *tessellaris*-group hitherto.

DISTRIBUTION. Known only from Jamaica.

MATERIAL EXAMINED

Halesidota elota Möschler, holotype ♀, Jamaica (MNHU).

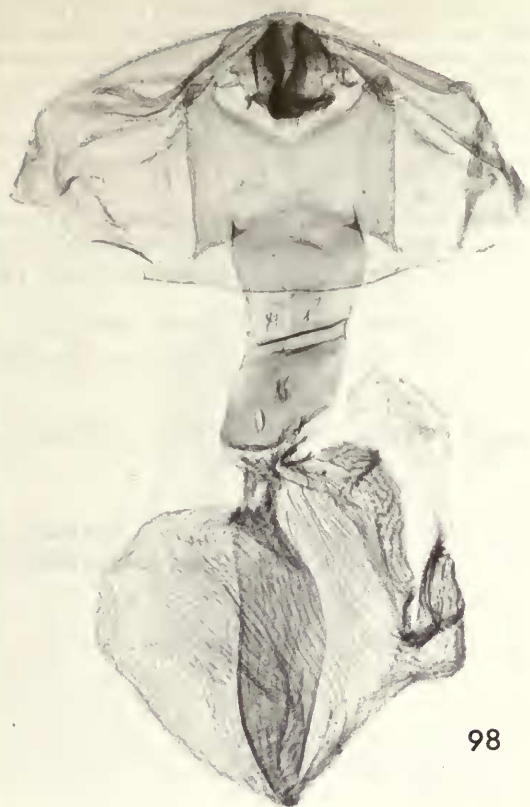
Jamaica: 2 ♀, Newcastle; 2 ♂, Cinchona iv.–v.1891, 2.i.1899; 1 ♀, Oracabessa; 1 ♀, Portland Parish, 1 mile [1.6 km] N. of Hardware Gap, 12–20.xi.1966; 1 ♀, St Ann; 2 ♂, 3 ♀, 'Jamaica'. (All examples in BMNH.)

Halysidota leda (Druce)

(Figs 102–106)

Phoegoptera leda Druce, 1890: 497.

DESCRIPTION. ♂ and ♀. Forewing: ♂, 31–36 mm; ♀, 37–41 mm. Head brownish yellow, with black lateral spot at each side of clypeofrons. Basal segment of palp black proximally, brownish yellow distally; segments 2 and 3 black with brownish orange anterodistal patch. Antenna brownish yellow; longest antennal pectination twice (♂) or equal to (♀) diameter of shaft at that point. Patagia and tegulae brownish yellow or orange; each tegula with black spot anterolaterally. Rest of thorax brownish yellow or orange except for black lateral band extending from eye to base of hind wing. Legs orange-yellow, darkest on outer surface;



Figs 98–102 *Halysidota*. (98) *elota* ♀ genitalia, slide 2472, Jamaica. (99, 100) *elota* ♂ genitalia, slide 2466. (101) *elota* ♀ wings. (102) *leda leda* ♀, wings.

markings black. Microtymbal number: 19–20. Upper surface of forewing brownish orange. Markings poorly defined (absent except at costa in *leda enricoi*), composed of scattered black scales; trace of sub-basal and antemedial fasciae, less weakly marked medial and postmedial fasciae; subterminal fasciæ either concolorous or represented by two parallel, dentate lines; terminal fascia absent, represented either by a few black scales or pale yellowish brown edged with black scales. Hind wing brownish yellow, transparent except at margins; with few black scales apically in some specimens. Under surface of wings a more brownish yellow than upper surface; markings more clearly marked distal to cell, absent or hardly visible proximad. Abdomen brownish orange dorsally, pale brownish yellow ventrally; black spot laterally on each side of sternites 3–7 (♂), 3–5 (♀ of *leda leda*) or 3–6 (♀ of *leda enricoi*).

♂ genitalia (Figs 104–106). Apical saccular process of valve extends distally beyond apical costal process; setose process of costa longer than non-setose process. Tegumen broad, shoulders spinose. Lobes of vesica as in illustration; scobinate on ventral surface of two proximal anterior lobes and on morphologically right-hand surface of rest of vesica.

♀ genitalia (Fig. 103). Pre-ostial plate tapered and falcate postero-laterally; appendix bursae large.

DIAGNOSIS. The colour-pattern readily distinguishes *leda* from all other species of *Halysidota* sensu stricto.

DISTRIBUTION. Known only from the Windward Islands: *leda leda* from Dominica and Guadeloupe, and *leda enricoi* from Martinique.

Key to subspecies

Forewing fasciae distinct; dorsal surface of thorax brownish yellow *leda leda* (p. 60)
Forewing fasciae absent or represented only at costa; dorsal surface of thorax orange *leda enricoi* (p. 60)

Halysidota leda leda (Druce)

(Figs 102–106)

Phoegoptera leda Druce, 1890: 497, LECTOTYPE ♀, WINDWARD ISLANDS: Dominica (BMNH), here designated [examined].

Euhalsidota leda (Druce); Kirby, 1892: 209.

Halysidota leda (Druce); Hampson, 1901: 170.

DIAGNOSIS. The nominate subspecies differs from *leda enricoi* in the fasciate forewings, the brownish yellow dorsal surface of the thorax, the smaller black spot (less than 1 mm in diameter) on each patagium and by the smaller lateral spots on the abdomen.

MATERIAL EXAMINED

Phoegoptera leda Druce, lectotype ♀, **Windward Islands:** Dominica (*Angas*) (BMNH).

Windward Islands: 1 ♂, Dominica, 1905 (BMNH); 1 ♂, 1 ♀, 4 miles [6.2 km] E. of Pont Casse, 12–23.vi.1964 (BMNH, presented by USNM); 1 ♂, 1 ♀, Guadeloupe, Mamelle du Pt Bourg, 530 m, 9–12.vi.1978 (BMNH, presented by Count H. de Toulgoët).

Halysidota leda enricoi Toulgoët

Halysidota leda enricoi Toulgoët, 1978: 377, Holotype ♂, WINDWARD ISLANDS: Martinique, Morne vert, v.1967 (*Enrico*) (MNH) [not examined].

DIAGNOSIS. Separable from *leda leda* by the almost complete absence of transverse fasciae on the wings, the orange dorsal surface of the thorax, the larger black spot (greater than 1 mm in diameter) on each patagium, and by the larger black lateral spots on the abdomen.

MATERIAL EXAMINED

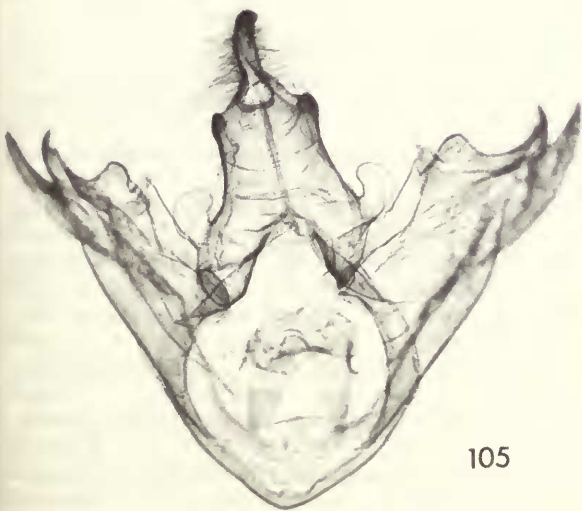
Windward Islands: 1 ♀, Martinique, Morne vert, v. 1967 (BMNH); 1 ♀, Martinique, Fort de France, Balata, 10.xii.1966 (BMNH). (Both specimens presented by Count H. de Toulgoët.)



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Figs 103–106 *Halysidota leda leda* genitalia. (103) ♀, slide 2474, Dominica. (104–106) ♂, slide 2475, Dominica.

Systematic checklist of *Halysidota* Hübner sensu stricto

This list follows the sequence of species adopted in the preceding text.

HALYSIDOTA Hübner, [1819]

tessellaris (Smith, 1797)

antiphola Walsh, 1864

oslari Rothschild, 1909 **syn. n.**

antipholella Strand, 1919 (infrasubspecific name)

tesselaroides Strand, 1919 (infrasubspecific name)

harrisii Walsh, 1864 **sp. rev.**

meridionalis Rothschild, 1909 **nom. rev., stat. n.**

insularis Rothschild, 1909 **nom. rev., stat. n.**

ruscheweyhi Dyar, 1912 **nom. rev., stat. n.**

davisii Edwards, 1875

schausi Rothschild, 1909 **sp. rev.**

pallida Rothschild, 1909 (junior homonym)

mexiconis Strand, 1919 (replacement name) **syn. n.**

brasiliensis Rothschild, 1909 **nom. rev., stat. n.**

yapacaniae **sp. n.**

tucumanicola Strand, 1919 **nom. rev., stat. n.** (replacement name)

tucumana Rothschild, 1909 (junior homonym)

pearsoni **sp. n.**

steinbachi Rothschild, 1909 **sp. rev.**

fuliginosa Rothschild, 1909 **sp. rev.**

carinator Dyar, 1912, **syn. n.**

meta Strand, 1919 (infrasubspecific name)

orientalis Rothschild, 1909 **nom. rev., stat. n.**

modalis Dyar, 1912 **syn. n.**

conflua **sp. n.**

underwoodi Rothschild, 1909 **sp. rev.**

bricenoi Rothschild, 1909 **syn. n.**

meridensis Rothschild, 1909 **syn. n.**

lucia Strand, 1919 (infrasubspecific name)

pectenella **sp. n.**

atra atra Druce, 1884

atra rindgei **subsp. n.**

instabilis Dyar, 1912 **stat. n.**

donahuei **sp. n.**

cinctipes Grote, 1865 **sp. rev.**

ata **sp. n.**

ata Strand, 1919 (infrasubspecific name)

nigrilinea **sp. n.**

intensa Rothschild, 1909 **nom. rev., stat. n.**

subterminalis Strand, 1919 (infrasubspecific name)

interlineata Walker, 1855

jucunda (Herrich-Schäffer, [1855])

fumosa Schaus, 1912 **nom. rev., stat. n.**

masoni (Schaus, 1895)

elota Möschler, 1886 **comb. rev.**

leda leda (Druce, 1890)

leda enricoi Toulgoët, 1978

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